Ag and Food Interprets . . .

- High interest in granular herbicides for water weed control
- "Production potentials" program aims for high yields at low cost
- Economics main barrier to putting substandard soils to use
- Nitrogen output still below capacity but will hit new peak in '59
- Fertilizer sales by co-ops increased by 5% between '56 and '57

Water Weed Control

Chemical herbicides, often costing less than mechanical methods, find increased use in water weed control

THE BOOM in boating and other water sports brings even more attention to weed control problems in streams, lakes, and other bodies of fresh or nearly fresh water. Not to be neglected are weeds in farm ponds, ditches, and irrigation canals, which carry water during periods of a few days per year to eight or nine months a year—and in some cases continually.

Much of the research and testing of herbicides and herbicidal formulations for all types of aquatic and ditchbank weeds is done by state and USDA weed specialists. However, herbicide manufacturers are stepping up their research and development efforts in this field as rising sales justify costs. But compared to the amount of research done on agricultural weeds, the amount thus far conducted on aquatic weeds is scant, says one aquatic weed specialist.

Two Types of Problems

Weed specialists separate aquatic weed problems into two general classes—those concerned with weeds in recreational ponds, lakes, and streams, and those concerned with weeds in navigational and agricultural water systems. Many weed species occur in both classes; which class is more important from a control effort

Spraying ditchbank weeds increases water flow at less cost than mechanical weeding

standpoint depends on location, type of weed present, water requirements, and public and political pressures. Another growing factor in aquatic weed control is interest in herbicides on the part of pollution control agencies. More states are expected to follow examples of New York and others which now require pollution control board approval before use.

Algae Got Attention First

Algae have received chemical control attention longer than most other kinds of weeds. Copper sulfate and sodium arsenite are widely used materials. But both have shortcomings. Copper sulfate must be applied repeatedly (although in low concentrations) to be highly effective. Arsenicals have a toxicity problem, and some recommendations are for less than 4 p.p.m. total As_2O_3 per year to avoid significant fish kills. Among organic chemical materials, RADA and Dichlone have given successful control against some algae. Much more effort is needed to evaluate other specific organic algacides that have come from laboratories in the past three years.

Sodium arsenite is also widely used for submerged varieties of aquatic weeds. States of the upper Midwest —Wisconsin, Minnesota, Michigan, and others—rely heavily on this material. However, they, like other states, now are testing 2,4-D in granular or pellet forms for use on submerged weeds. Many weed specialists consider granular or pelleted aquatic herbicides as one of the most significant application developments in 25 years.

Mechanical Weeding Waning

Even yet in some areas, control of submerged and floating weeds in fresh water is attained by physical methods —pulling or cutting. These methods, however, are declining fast as costs rise. In parts of the South, chemical treatment along with winter fertilization of ponds proves most effective if outflow during winter and early spring is low. In other states, such as Wisconsin, waters are becoming so fertile that fertilizer materials in the state's waters are avoided. Applying 2,4-D in light oil or as an amine or ester emulsified in water proves effective with fertilization.

Floating weeds such as water hyacinth, alligator weed, water lettuce, and water fern found widely in the South obstruct navigation, restrict water flow, and clog pumps. Long ago growth of these and other weeds far outstripped practical mechanical control methods. Chemical methods have filled the breach in part. For example, Louisiana's water hyacinth control program has developed use of amine salts of 2,4-D to a high level since 1952. About four pounds per acre of the salt causes death and sinking of the water hyacinth mat in six to eight weeks. A follow-up eight weeks after the initial application catches skips. Subsequent patrols at intervals of three, six, or 12 months round out the program.

Newer herbicides such as dalapon, silvex, amino triazole, and invert emulsions of 2,4-D or 2,4,5-T, among others, look promising. What weed control authorities would like to find is a general herbicide effective against all aquatic weeds. So far, general herbicides tend to vary in effectiveness with season or climatic conditions. Thus efforts to find herbicides for floating and emergent weeds lean toward specific chemicals. While it may never be possible to find one, a general algacide is hoped for, since troublesome algae exist in wider variety of species than do troublesome submerged weeds, for example. And, of course, low toxicity to fish and other animal life is needed.

Aquatic Weed Control Problems

Despite what seems to be rapid acceptance of aquatic herbicides, there remain several difficulties in their use. A problem of possible fish kill in relatively small ponds or quiet waters results from rapid depletion of oxygen in the water by decay of treated weeds. Covering limited areas at one time avoids this problem, but raises application costs.

Some floating weeds present special problems. Water lettuce and water fern leaves are difficult to wet. For these types, invert emulsions of 2,4-D and 2,4,5-T are showing real promise, and give less spray drift hazard. Against alligator weed (strictly speaking, not a floating weed, because it does have roots) in Florida, 2,4-D in an organic solvent plus a non-ionic emulsifier, giving a liquid with specific gravity slightly greater than 1.0, proves effective in quiet water. Keys to successful kill are spraying the herbicide mixture so that it surrounds the submerged portions of the weed, slowly sinking to the bottom, and minimum water movement, permitting the material to act on the underwater mass of the plant. However, polychlorobenzene in the mixture is highly toxic to fish, limiting the use of this technique.

Limitations of the phenoxy compounds for use in irrigation waters are difficult to surmount when such crops as tobacco, many vegetables, and legumes are involved. Similarly long residual life of some herbicides limits their use under the Miller Amendment in irrigation ditches which carry water to food crops.

Ditchbank weeds, usually of the grass type and technically not aquatic weeds, hinder water flow and also consume part of the water in irrigation and drainage ditches. They are especially troublesome where ditches are used little, perhaps no more than a month per year. Mowing is effective on sides and tops of banks, but not in the ditch bottom where weeds are most troublesome. Dalapon, alone or mixed with amino triazole, gives effective control when applied during early growth stages and when the ditch is subject to flooding at frequent intervals. Borates, chlorates, arsenicals, chlorophenylureas, and certain triazine materials also are effective but may endanger crops; soil sterilants may cause erosion if ditchbanks are sandy or gravelly.

Granules and Pellets Have Bright Future

Tempering enthusiasm with caution, aquatic weed control researchers still foresee a bright future for granular and pelletized herbicides. Few researchers have had more than one year's experience with them, and several say that two years' further work is needed to confirm present prospects.

At present, problems in use of granular or pelleted materials include:

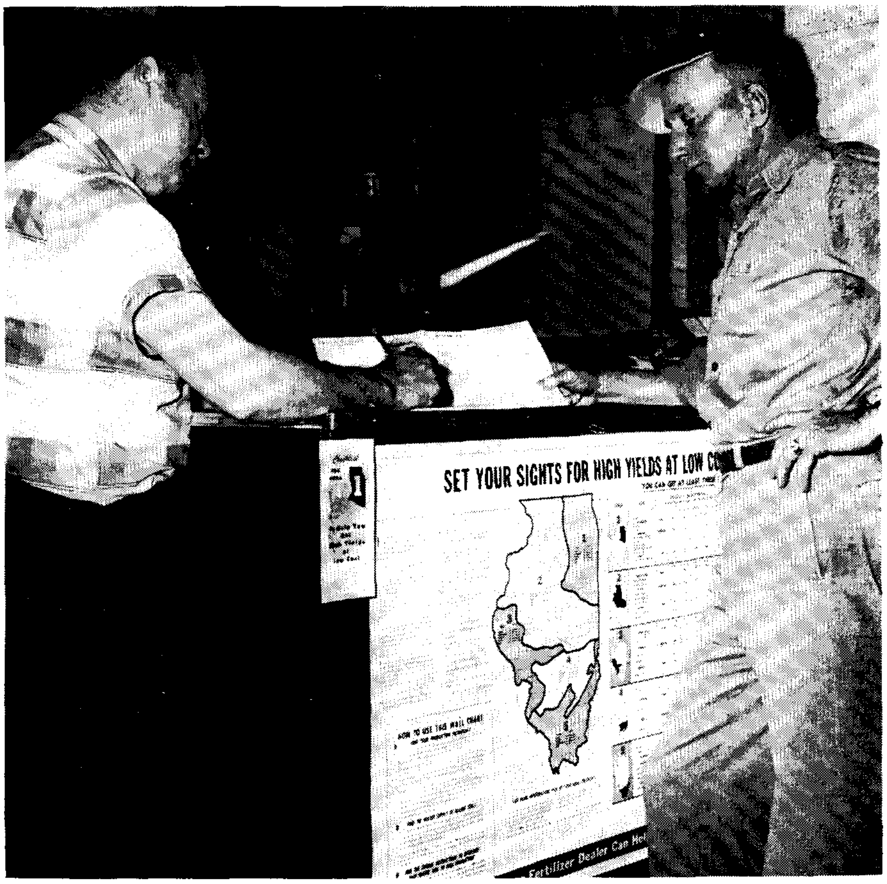
- Limited range of herbicides available in these forms, thus limiting types of weeds that can be controlled.
- Relatively high cost (although this may be offset by greater effectiveness).
- Finding optimal rates of application correlated with timing.
- Selecting the best carrier material for a given herbicide and for use conditions.

With as wide interest in granular forms as appears in various parts of the country, solutions to part or all of the problems can be expected.

Without doubt, use of chemical herbicides for aquatic weeds will expand, and for a time it will be at a relatively rapid rate. Also without doubt, new problems and greater emphasis on present problems will arise with increased use. Research efforts, now being stepped up, will prove vital in solving these problems and broadening aquatic weed control markets for herbicides.

High Yields at Low Cost

"Production potentials," other "farming for profit" programs lean heavily on correct fertilizer use



NPFI's program uses wall charts (like this one displayed by an Illinois dealer) to list crop yields and management practices needed to reach those yields

"Higher farming profits are definitely possible." That's the message being carried to the midwestern farmer *via* the National Plant Food Institute's "production potentials program." Meanwhile, Mississippi is "blazing a new road to progress" with a "unified agricultural program." And Georgia has recently summarized the first year's results of a six-county "intensified soil fertility program."

All of these plans have one broad aim: to help farmers make more money. And they emphasize proper fertilizer use as a major tool to raise profits.

Most ambitious of the plans, in terms of territory covered, is NPFI's emphasis on production potentials. Originated and being put into effect by the institute's Midwest regional office (formerly the Middle West Soil Improvement Committee), the program will cover all 13 states in the Midwest by January 1960.

Production potentials are realistic crop yields that a farmer could—in fact, should—average over a period of years, says Zenas H. Beers, director of NPFI's Midwest office. The plan is based on crop yield potentials calculated by state agricultural workers for the different soil types found in their areas. These are the yields that good management practices like proper fertilization, seeding, and pest and moisture control (where possible) can bring within reach.

Data collected for each state are incorporated by Beers' group into a wall chart which summarizes such basic information as:

- Average annual rainfall
- Type of soil
- Per cent slope
- Subsoil permeability
- Yield potentials
- Fertility status and special features.

Checklists for different areas within a state are made up for farmers' use. The checklist serves two purposes. First, it is a record book in which the farmer can keep track of fertilizer used. Second, it lists specific management instructions for the different crops which can be grown on the soil concerned. These instructions must be followed to realize production potentials.

Yields listed on each wall chart represent a projected 10-year average. On a year-to-year basis, actual yields may vary by 20% below or above the figure given.

Wall charts and checklists are furnished free of charge to extension workers, county agents, soil scientists, and banks. NPFI members obtain them at less than cost, and, in turn, distribute them to their dealers. The dealers and agricultural workers make the information available to growers in their areas.

At one time or another, probably all states have estimated yield potentials. But a single average is usually calculated for a whole state—for example, 85 bushels of corn per acre for all of Ohio. Beers says that with such a figure, many farmers who could have produced more were content with only 85. And some of those who had poor soil became skeptical about farm practices recommended to reach the figure.

Beers reported in February, at the 11th annual joint meeting of midwestern college agronomists with the fertilizer industry, that the NPFI program is in full swing in Illinois, Wisconsin, Minnesota, Kansas, and South Dakota. Michigan will be covered this spring. In the other midwestern states (Kentucky, Ohio, Nebraska, North Dakota, Indiana, Iowa, and Missouri), data are being collected rapidly to meet the January goal of full Midwest coverage.

Georgia Totals a Score

Georgia's "pilot" program of intensified emphasis on soil fertility has led to a 10% hike in fertilizer usage in the six counties involved during 1958, according to University of Georgia agronomist Ralph L. Wehunt. Lime consumption rose by 300 to 500%.

The increase in actual plant nutrients used in the six counties amounted to 17.5%. By contrast, fertilizer consumption in the entire state dropped one per cent from 1957. And crop yields in the six-county area were

121% above the 1951–55 average yields. For instance, average corn yield per acre went up from 18 bushels to 39.8.

Mainstay of the Georgia program is soil testing. One main objective was to focus attention of growers on using the right kind and amount of fertilizer and lime. Soil tests helped fulfill this goal. County agents and their assistants spearheaded the project, which resulted in 14,014 soil tests compared to 2,200 in 1957. Wehunt concludes that a well-organized approach to soil fertility can have a "tremendous, beneficial influence" on fertilizer usage.

The heart of Mississippi's unified agricultural program is a publication which points out some major farm trends and how these affect the state's farmers. Included in the booklet, made available to all counties, is a map of soil types. And the experiment station publishes a yearly fertilizer recommendation chart that's broken down by soil types and crops. Annual variety recommendations are published, too.

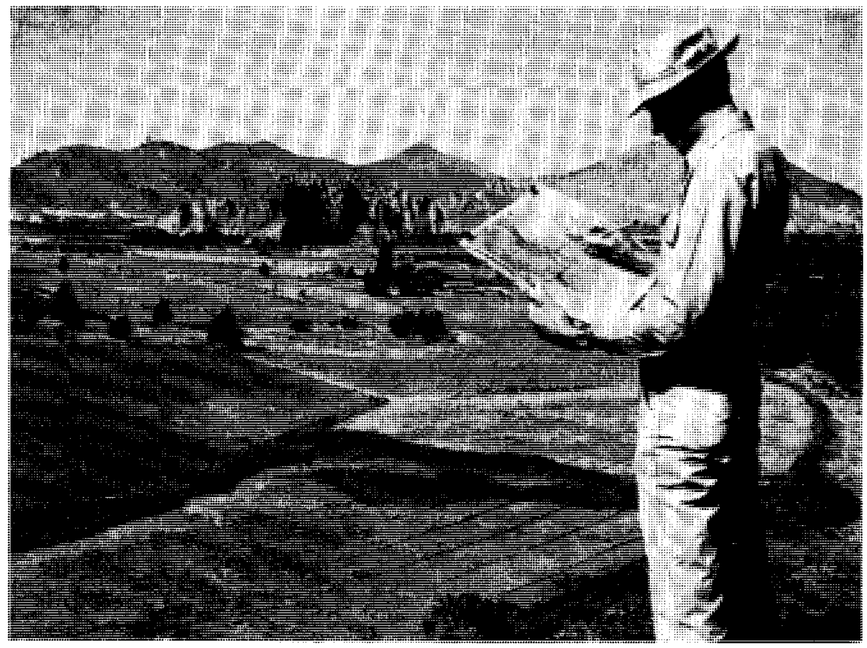
Although no one part of the project is unique to Mississippi, the package as a whole is. Si Corley, the state's commissioner of agriculture, says the plan was greeted with enthusiasm at the state level in 1956. The idea was for all counties to study the publication and then develop programs based on local needs.

Some counties have started such programs. And they've proved beneficial, says Corley. Many others, though, have not. In still other counties, the plan slowed up because it wasn't followed through once it got started.

Help Farmers to Help Themselves

NPFI's project is aimed primarily at those farmers who think they are already farming satisfactorily, and are not even thinking of ways to improve their financial position. And about two-thirds of all farmers fall into this category, according to NPFI's study on farmers' attitudes toward the use of fertilizer (AG AND FOOD, April, 1958, pages 266–71). The program may help jar these growers into some thinking, an essential prelude to action. Moreover, notes Beers, proper use of the wall charts and checklists by dealers and salesmen can be a powerful sales tool in merchandising fertilizer.

Beers emphasizes that the program is not considered the final word on crop yields and farm management techniques. It's meant to be a guide, subject to revision as experience and new data are obtained. What's needed to make such a program a complete success? A strong effort by everyone concerned—dealers, fertilizer manufacturers, ag workers, and NPFI—to sell the farmer on production potentials.



Soil reclamation and rejuvenation require the knowledge of soil scientists concerning plant growth, chemistry, weather, geology—and money

Land Management

Main barrier holding many substandard soils out of production is economics. When these soils are needed, soil scientists will know how to make them productive

MORE THAN A MILLION ACRES of U. S. cropland or potential cropland is taken out of agricultural circulation every year, according to the Soil Conservation Service, USDA. About half of this is poor land, damaged by wind, water, and poor farming practices. But much of the other half—which disappears under the concrete of subdivisions, roads, airports, industrial developments, and government reservations—is good land, land that could be more productive than the average U. S. farming acre.

So far, this loss of land has not hurt the country's capacity to feed itself, nor will it for several generations. After all, only a fourth of the 1.9 billion acres in the mainland U. S. is now farmed, and only 6% is "under concrete." Crop surpluses from the 25% now farmed are costing the government billions of dollars a year, both in trying to hold the surpluses down and, having failed, in buying and storing the excess. And there is 700 million acres of pasture and grazing land, plus 600 million acres of forest and woodland, much of which could be managed more intensively if conditions demanded.

Nonetheless, some day there will be a problem, as population increases and as more and more land goes into nonagricultural uses. Land use practices (such as keeping housing developments out of good farm land) fall far short of the ideal of saving farm lands for farming, pasture and tree lands for pastures and trees, and agriculturally unproductive land for nonagricultural uses.

Despite these obvious shortcomings, though, much is being done to ensure that our descendants will have the land on which to produce the things they need. There are three major parts of this program:

- Soil conservation—keeping productive soils productive.
- Soil rejuvenation—restoring to productivity land once fruitful but no longer so, because of erosion,

over cropping, salinity, inadequate drainage, and plant disease.

- Soil reclamation—bringing into production land never used for farming before, by providing water to irrigate good, arid lands and by treating alkali or saline soils.

As Firman Bear of *Soil Science* puts it, "It is soil management to the end that soil stays put, that alkalinity and salinity are not permitted to get out of control, and that wind and water are kept in check to prevent the building up of their forces to the point of destructive actions."

But once these aspects are under control, chemistry begins to play an important role. Because fertilizers are now cheap and available, soil fertility may no longer be the limiting factor. Rather, soil structure, biotic environment, availability of water become limitations to productivity.

This is a major departure from the thinking of a half century ago. Then, soils which were naturally more fertile were more rewarding to farm. When a farmer began to need fertilizers to replenish his soil, it was often more economic for him to abandon his farm and settle "out west" on virgin soil; fertilizers were expensive. And farmers working the naturally-less-fertile soils of the South and East found it very difficult to compete with those working the rich Midwest lands freshly broken to the plow.

Now, though, soils in the Southeast and other well-worked farm areas, when properly managed, can be as productive as those in the Midwest or West. All it takes is application of knowledge gained by agricultural scientists about principles of crop production and soil management, plus a knowledge of local weather and geology, plus the money to apply this knowledge.

Thus this country has a tremendous reservoir of potential farm productivity on lands already being farmed—if farmers would apply knowledge already at hand. When the country needs great increases in farm production, a large part of those increases will come from applying this knowledge to depleted soils that now are either inactive or are returning to their owners a bare subsistence.

Soil experts claim there is already considerable information and knowledge available both to reclaim and to increase productivity on lands when the need arises, although obtaining enough productivity to make this worthwhile is still a problem at times. Both are being done successfully now in some parts of the country. But

Much Land Left

	Million Acres
Total land area—Continental U. S.	1904
Cropland	409
Pasture and grazing land (nonforested)	700
Forest and woodland	606
Special-use areas (cities, roads, etc.)	105
Miscellaneous	84

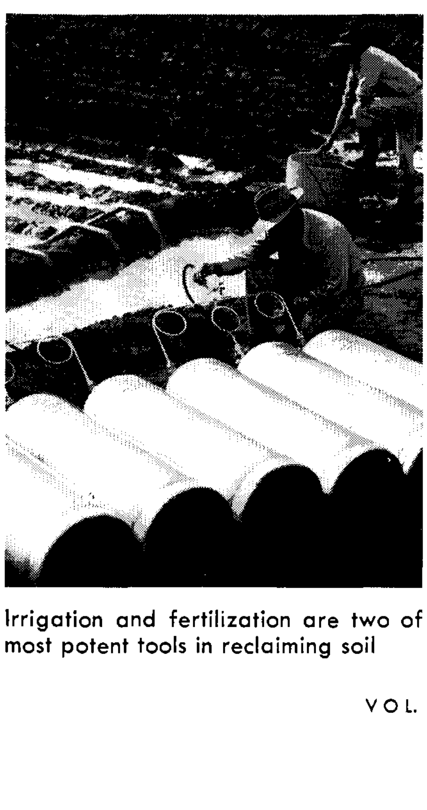
Source: Soil Conservation Service, USDA

vast areas are still wastelands. "It is mostly a case of economics," says Daniel G. Aldrich, University of California's dean of agriculture. "When land can be reclaimed for less money than good land can be bought for, land will be reclaimed. Until then, soil scientists had best refine their knowledge of soil structure, chemistry, and microbiology, both to reduce recovery costs and to handle some problems that now give them trouble."

Water and Drainage

Reclamation needs can best be summed up in two words—water and drainage. With these, saline soils can be leached clean of salts—usually all that is needed (besides more water to do the actual farming). Alkali soils present more of a problem, since water penetrates them only slowly. In these cases, ion exchange reactions remove sodium from the soil by exchanging it for calcium. This improves the state of aggregation of the soil and lets the water percolate through it. The biggest questions in this sort of work, according to reclamation experts:

- Where will water of good quality and low cost come from?
- Where will it go when it has drained through the reclaimed areas? (In Southern California, irrigation water from the Imperial Valley drains eventually into the Salton Sea, and is threatening to raise the level of that lake.)
- What is the best way to overcome alkali in any specific situation? Nearly every situation poses different problems and much yet remains to be learned.



Irrigation and fertilization are two of most potent tools in reclaiming soil

Rejuvenation, A Knotty Problem

Rejuvenation, however, is a much knottier technical problem. Worn-out soil may have become worn-out for any of a tremendous number of reasons, although these reasons generally fall into three basic categories—soil structure, nutrient deficiencies or unavailabilities, and microorganisms. To find the basic cause and to correct it take the combined efforts of scientists of varying disciplines, each adding his bit of knowledge.

Two examples illustrate the point. In the citrus groves of southern California, yields often fall off after some years. Into one such area came a group of experts from the Riverside campus of the University of California. Although study is continuing, the group has already found a potful of reasons why yields have fallen off. These range from lack of nutrients such as phosphorus or nitrogen, to pathogenic organisms (e.g., nematodes), and a root-attacking fungus which prevents the tree from absorbing nutrients from the soil. Sometimes many such causes are present, each adding its deleterious effect to the whole.

In the Dakotas, some farmers used to grow only flax on their land, year after year. Eventually, yields fell drastically and the farmers abandoned their land as useless. Study of the soil revealed, however, that continued cultivation of the single crop—flax—had given a strain of Fusarium, a soil-borne wilt which finds flax an excellent host, the chance to multiply enormously. Result: it damaged flax and, because of its great abundance, also hurt yields of any other crop to which the farmer shifted in desperation over the flax problem. The solution in this case was to let the land lie fallow for a few years while the organism died out, and then to rotate crops when the land was put back into service.

These examples show how complicated are the problems of rebuilding a soil to its greatest productivity.

Fruitful Area Is in Soil Physics

But much more research remains to be done. Most soil scientists agree that the most fruitful area for such research is in soil-climate-plant relationships—soil physics, so to speak—and how to use them in specific cases to get maximum yield and quality at minimum cost. How and when should plant nutrients be introduced in any given soil to get the greatest benefit? What is the influence of varying amounts of many trace elements which, although not now known to be essential to plants, undoubtedly influence the behavior of the plant? How does the biotic environment below ground exert its influence, which probably is fully as important to plant growth as the effects of nutrients and water?

R. L. Luckhardt, supervisor of agricultural technical services for Collier Carbon & Chemical (Los Angeles), sums up the present situation this way: "I know of no business of this magnitude which is so unscientific as this one (the fertilizer business). When a farmer applies a chemical to kill bugs, he at least goes out to his field later to see if the bugs are dead. But in 99 cases out of 100, the same farmer has no idea at all whether the fertilizer he applied ever was used by the plants he was growing, or if it was, how much of it was, or if it wasn't, how he could vary his application schedule or source of nutrient to his specific needs, so it would be used."

And Luckhardt concludes, as have many others, that if the business ever does get "scientific," it can put off beyond the foreseeable future the day when this nation will be short of the land needed to grow food for its people.

Nitrogen Surplus

Production to hit new peak this year, although European and U. S. plants operate below capacity

WORLD NITROGEN PRODUCTION will again hit a new high for the 1958–59 season. Total output is estimated at 10,452,000 metric tons on a pure nitrogen (N) basis, in the latest annual report by Aikman, Ltd. (London). The gap between production and consumption promises to be larger than it has ever been, with production exceeding consumption by about 595,000 metric tons. However, as a percentage of total production the latter figure is not quite so high as it was three years ago during 1955–56: 5.8% then, *versus* 5.7% this year.

Producers in the U. S. and Europe have cut down output because of low prices, and will probably continue to do so next year. American producers are working at only about 75% of capacity, while the big European producers, Germany, France, Belgium, and Italy, are probably working at about 80%.

European stocks stand at about 6% of annual output now, or about 300,000 metric tons. Most of this is in the form of ammonium nitrate and urea. Ammonium sulfate consumption is about the same as production, since this form, because of its high cost, is the one producers usually cut back on first.

The U. S. is not the only place where ammonia plants have been shooting up. European producers are uneasy about new capacity in Greece, Turkey, Iran, Egypt, India, Pakistan, and communist China. China is the world's largest importer of nitrogen. Her imports this year should be about 320,000 tons. Lower and lower prices have been offered there to get a share of this very large market.

For political reasons, a large part of the contract for delivery of Japanese nitrogen to China was cancelled this year, leaving Japanese producers hard pressed. However, this pressure has been relieved somewhat by large sales

Estimated World Production and Consumption of Nitrogen for Agriculture and Industry

(thousands of metric tons)

	1955–56		1956–57		1957–58		1958–59	
	Prod.	Cons.	Prod.	Cons.	Prod.	Cons.	Prod.	Cons.
Europe and Egypt	3798	3318	4172	3675	4691	3977	5181	4169
U. S. A.	2700	2500	2735	2735	2950	2950	3100	3100
Canada	517	237	475	259	575	405	655	431
Asia	925	1286	1089	1437	1281	1719	1420	1813
Others	88	219	92	278	94	315	96	344
Total	8028	7650	8563	8384	9591	9366	10,452	9857
Industry	1255	1255	1385	1385	1535	1535	1645	1645
Agriculture	6773	6305	7178	6999	8056	7831	8807	8212

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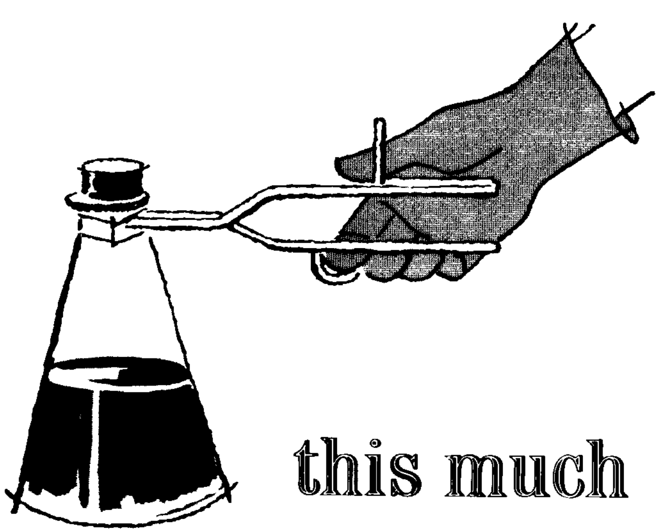

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to Korea, at prices generally lower than those offered by Europeans and Americans. Japan will sell Korea 70,000 metric tons of urea at $94.60, 89,000 tons of ammonium sulfate at $41.85, 50,000 tons of calcium cyanamide at $40.90, and 5000 tons of ammonium nitrate at $66.59. The U. S. got part of the Korean order: 26,200 tons of urea and 18,000 tons of ammonium nitrate. Japan will also probably get part of a large order for India: 100,000 metric tons of ammonium sulfate at $48.05 per ton, and 50,000 tons of urea at $107.10, delivered to an Indian port. About 50,000 tons of calcium ammonium nitrate for India will be bought in Europe.

European export prices have remained fairly steady, although for large orders to the Far East prices have been down to $39.20 for ammonium sulfate in bags, and $37.00 for calcium ammonium nitrate. These prices are probably not profitable for the producers, and Aikman believes that either they must rise or production will be curtailed further.

Government subsidies in the United Kingdom and in Germany have increased home consumption of fertilizer nitrogen.

Chilean nitrate producers are suffering from higher production costs arising out of the increasing cost of living in Chile. Many producers, in fact, will probably be closed down if the government does not come to their aid. Large mechanized producers using solar evaporation, however, are still doing very well, although prices in the U. S. (their largest market) have recently been reduced by $5.25 per ton.

Co-ops

Fertilizer business of co-ops showed bigger gain than did fertilizer use as a whole in 1956–57

Fertilizer and farm chemicals manufacturers keeping a wary eye on the activities and growth of farmer cooperatives will do well to study the most recent USDA report on co-ops. For the fiscal year ending June 30, 1957, fertilizer co-ops increased their business from the previous year's $261,255,000 to $274,615,000 (see table). That is a 5% increase, accomplished during a year when fertilizer use as a whole increased 5% on a primary plant nutrient basis (but only 1.7% on a tonnage basis). And there are signs that co-op growth in fertilizers continued in 1957–58 to outpace that of the rest of the fertilizer industry.

Co-op sales of sprays and dusts also increased during the same period, from $35,373,000 to $40,707,000.

In total business, fertilizer ranked as the third biggest item for the farm supply cooperatives in 1956–57. It was exceeded by feed ($804,286,000) and petroleum products ($529,679,000).

Membership in farm co-ops dropped in 1956–57 for the first time. USDA comments that the number of memberships may have passed its peak, and that this decrease is to be expected in view of the decreased number of farms. The number of cooperatives remained about the same, 9876 in 1955–56 and 9872 in 1956–57. Many co-ops discontinued operation during the year, because of liquidation, consolidation, or merger, but many new ones were formed. There had also been a slight decrease in the number of co-ops between the 1955 and 1956 fiscal years.

The number of co-ops that handle fertilizer totaled 4143 in 1956–57—132 more than in the previous year. Those that handle sprays and dusts numbered 2334, compared with 2145 in 1955–56. Farm supply cooperatives represented 34% of the total number, and accounted for nearly 46% of the total memberships.

The growth and health of farmer cooperatives has raised some spirited debate among members of the fertilizer industry in recent years. Ag and Food will examine these arguments in depth in a special staff-written report in the April issue.

Estimated Business of Cooperatives

Item	No. of Co-ops Handling (1956–57)	Net Business after Adjusting for Duplication[b] (1955-56) $1,000	Net Business after Adjusting for Duplication[a,b] (1956–57) $1,000
Products marketed for patrons:			
Beans and peas (dry edible)	73	29,537	27,842
Cotton and cotton products	607	507,944	487,397
Dairy products	1,917	2,539,205	2,759,409
Fruits and vegetables	756	721,986	721,783
Grain, soybeans, soybean meal, and oil	2,701	1,572,018	1,663,529
Livestock and livestock products	604	1,179,421	1,172,995
Nuts	106	91,238	96,211
Poultry products	681	351,494	356,361
Rice	61	132,922	140,392
Sugar products	66	125,041	286,262
Tobacco	37	189,989	199,586
Wool and mohair	284	25,425	24,386
Miscellaneous	225	43,748	44,556
Total farm products	7,017[b]	7,509,968	7,980,709
Supplies purchased for patrons:			
Building materials	1,501	78,773	81,807
Containers	1,044	25,235	26,722
Farm machinery and equipment	1,843	68,497	71,083
Feed	4,499	773,955	804,286
Fertilizer	4,143	261,255	274,615
Meats and groceries	971	46,757	48,782
Petroleum products	2,794	493,605	529,679
Seed	3,791	97,228	99,979
Sprays and dusts (farm chemicals)	2,334	35,573	40,707
Other supplies	4,529	163,394	166,367
Total farm supplies	7,406[c]	2,044,272	2,144,027
Receipts for services:			
Trucking, cotton ginning, etc.	5,334[c]	214,827[d]	234,573[d]
Total business	9,872[c]	9,769,067	10,359,309

[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.