and that equipment needed to handle a chemical of such a hazardous nature is expensive. They also point out that there are other ways to lower rates.

Trucks haul a substantial amount of ammonia, in addition to delivering it to the farmer customer. Estimates of truck transportation costs range between 40 and 60 cents per round trip mile (for a maximum capacity of 15 tons). The longer the haul by truck the higher the cost per ton-mile, the opposite being true of rails.

Generally speaking the economic maximum haul for a truck is about 250 miles. Yet, there are situations in which a longer trip is economical. San Jacinto Chemical, for instance, makes a 500-mile truck haul from Houston to West Texas, because rail shipment takes two weeks. Rental of a railroad car (most of which hold 26 tons) for two weeks adds about $2.00 a ton to the haulage charge. Truckers, on the other hand, will make an empty run and return to West Texas at less cost, the one-way trip taking only about 12 hours.

Variability of freight rates across the nation sets up some interesting anomalies. For instance, a Texas ammonia producer needs to equalize by only $3.00 or $4.00 a ton to meet competition in Florida; shipping ammonia by rail from Lake Charles, La., to Houston costs $4.00 a ton, but shipping it from Houston to Lake Charles costs $8.00 a ton. Thus, freight rates and/or willingness to take bigger equalizations make it possible for one producer to ship into another's backyard. Such situations allow ammonia from the Midwest to sell competitively with California ammonia in the Pacific Northwest.

Because of the cost of and confusion in land transportation, many inland ammonia producers are looking into the possibilities of water transportation. A barge line reports that it has had inquiries from an ammonia producer recently and there is talk that another producer is considering building dock facilities, its plant being located near a navigable river.

Water transportation has a reputation for being less expensive, but it has its limitation also. In general, water transportation is economical if there is large consumption of the product in a small area near the terminal. Barges for ammonia are expensive to build and they have capacities in the neighborhood of 1000 tons. That means that a large storage space must be available at the terminal, and terminal costs are high.

Some barges now in use were originally built for liquified petroleum gas, traffic in which is heavy during ammonia's off-season. Nice as such a solution would be, there are hitches here also—while propane tanks may be rated at 250 pounds or more, in some areas a working pressure of 265 pounds or more is required for some types of ammonia storage tanks.

Transportation's part in the marketing of anhydrous ammonia is difficult to isolate from the interplay of competition, but it is not difficult to see that its part in the final selling price of ammonia is considerable. As more and more ammonia expansion is completed and competition becomes more acute, there will undoubtedly be more and more effort to rewrite the role of transportation into a minor one.

Roadside Weeds

Most highway departments merrily mow along despite New York's saving of $60 a mile with chemicals. Result: a market awaiting development

SALESMEN PUSHING HERBICIDE purchases by state highway departments might easily draw their pitch from the Canadian Department of Agriculture and its recommendations: "Modern equipment makes roadside spraying easy. Modern chemicals make roadside spraying effective and economical. Chemicals control weeds on roadsides at half the cost of cutting and the results last much longer."

The department further states that roadsides serve as a bridgehead for the invasion of farmers' fields by weeds. Seeds, transported along the road by vehicles, soon spread to surrounding fields.

Nothing, they say, could be more discouraging to a farmer, who is trying hard to keep his place clean, than the sight of neglected roadsides. On the other hand, if a farmer sees familiar weeds and brush effectively controlled along the roadside, he often decides to apply the same treatment on his own fields. Thus, a roadside is one of the nation's best show windows for chemical weed control.

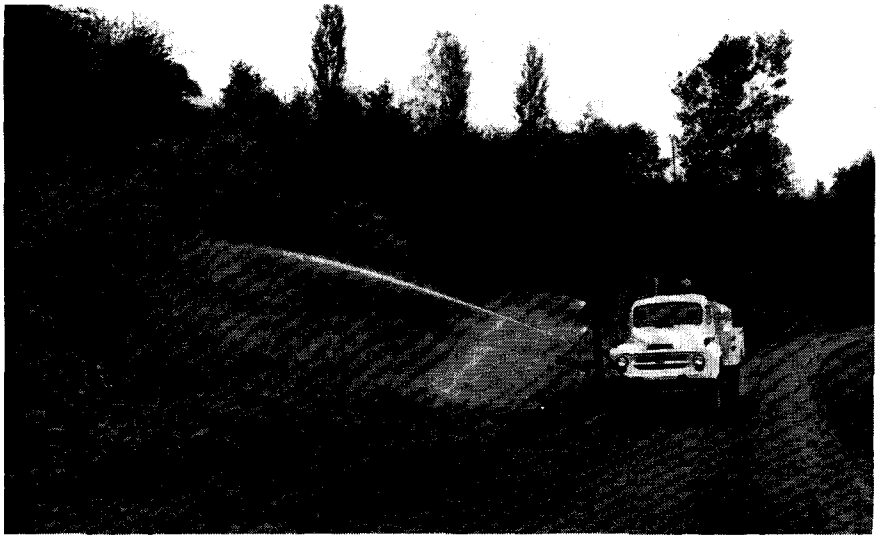
"Brownouts" along highways where brush control programs have been in effect are no doubt an obstacle difficult for many state officials to face squarely. The lack of skilled labor to apply chemicals properly has also posed a problem. In spite of these difficulties, some officials are slowly awakening to the advantages of herbicides, but many states have yet to get their programs into full swing.

Slow Increases Expected

Some states like Arizona and New Mexico have little need for an extensive weed control program because of their arid climate, and others (Arkansas and North Carolina), for various reasons, are still mowing right along in the same old way. Idaho and Utah rely almost entirely on their counties to carry out spraying activities which, they say, permits them to do all of their spraying at the right time of the season and at the proper time of the day when wind velocity is low.

At least a half dozen states (Florida, New Jersey, Maine, Louisiana, Missouri, and Texas) haven't moved beyond the experimental stage with their programs; they are still trying to determine which are the most effective weed killers for their areas, and how to apply them properly. Prospects for increased herbicide usage in most of these states for the next few years appear rather slim. Some officials say they have yet to reach any

The chemical spray truck for roadside weeds hit the economy target in a few spots, but most of the state highway departments still have to be sold

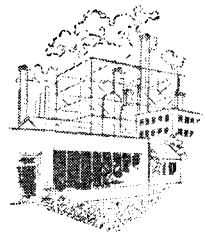


between you and this page

. . . is roughly one cubic foot of NITROGEN gas. Floating free in the air this nitrogen can't add to America's agricultural or industrial wealth. But Grace Chemical Company has opened a plant in Memphis, Tennessee, that "fixes" atmospheric nitrogen in the form of two very versatile compounds—ammonia and urea. (Shown in the photo are prills—tiny beads—of urea containing the equivalent to the amount of nitrogen gas between you and this page.)

Fixed in this way, nitrogen can enrich our crop farms, our livestock, and our homes—through its use in fertilizers, feed supplements, and the manufacture of products ranging from toothpaste to television cabinets.

Output of the $20,000,000 Memphis plant will be 72,000 tons of nitrogen a year. It will provide industry and agriculture these two forms of nitrogen from a *dependable* source—backed by a world of experience.



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definite conclusions from their tests, or that mechanical mowing is still the cheapest method.

Ten other states have programs which vary from extensive field tests to full scale treatment (75% of their road mileage), but all of these indicate they expect little or no increase in herbicide consumption for perhaps the next four or five years. California, for example, used approximately 500 tons of sodium chlorate and a like amount of borate-chlorate mixture during the past four years, working over more than 2000 miles of a fire control strip, and as part of a soil sterilization program around guard rails, sight and sign posts, bridges, and other roadside structures. State officials say they were able to cut back on soil sterilization last year; the department consumed only 15 tons of CMU, 60 tons of sodium chlorate, and 60 tons of borate-chlorate mixture. California also uses an estimated 300,000 gallons of aromatic weed oils annually to control weed growth among plantings along median strips between divided highways, and in other landscaped highways plantings. Ohio is near the top of the list in chemical weed control; this state plans to spray almost 8400 miles of highway (45% of the system) in 1955 with more than 17,000 gallons of 2,4-D and 3000 gallons of 2,4,5-T.

Kentucky officials say they do not plan any changes from present practices; the opinion in South Carolina and Ohio is that the President's proposed highway construction program will have little impact on herbicide consumption. Most roads to be built under this program will probably be sloped and sodded. Weeds are not a primary concern on new highways; Ohio avoids spraying such sections for a period of two years following completion in order to allow newly seeded areas to mature. Colorado, New Mexico, Tennessee, and Washington are among the states that do not expect an appreciable increase in their herbicide consumption during the next several years.

Custom Application Helpful

The McMahon Bros. of Binghamton, N. Y., have been very successful with their custom application work. One of the most interesting cases is a county-wide effort to control ragweed in Sullivan County. Every state, city, and county highway in the area was sprayed at a cost slightly under $10 per mile (comparable mowing costs are estimated at $70 per mile). This company has developed effective and economical equipment for roadside spraying which will cover up to 24 feet along the right of way, and is quoting a price of $29.50 per mile (16 feet on both sides of the road) for three separate sprayings. Raymond J. McMahon says single spraying is generally unsatisfactory; a good program should include three sprayings per season, for three consecutive years.

Right of Way Acres

Roadside Width	Roadside Length	Area
16 feet	907 yards	1 acre
20 feet	726 yards	1 acre
30 feet	484 yards	1 acre

U. K. Fertilizer

Postwar increase in production and consumption is continuing but usage still below that of many continent countries

Production of fertilizers in United Kingdom is continuing its wartime and postwar increase after a temporary interruption in 1951 and 1952. A 25% drop in sales during this period was occasioned by removal of government subsidies on fertilizers; demand, however, picked up sharply upon restoration of the subsidizing program. Data recently released by the Commonwealth Economic Committee for the year ending in June of 1954 show that the recovery continued during the past year.

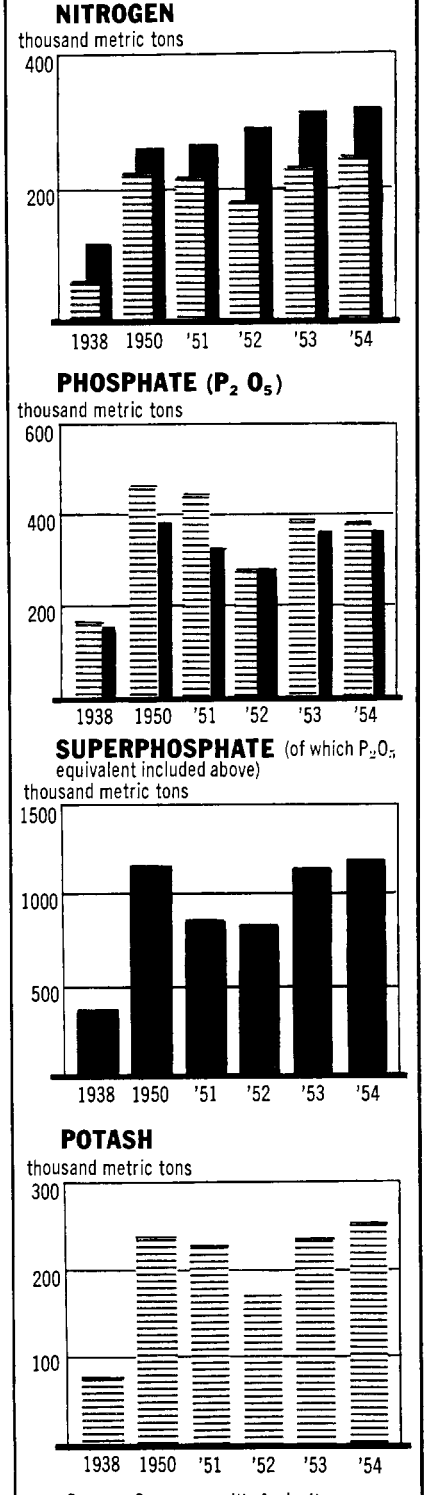
Farming acreage in U. K. is about the same as in 1939 though food production is 50% greater. The increased yield is chiefly attributed to greater use of fertilizer, which last year was three times that of prewar. Even so, actual use is far below that of many continental countries. In a report issued last year, OEEC showed that if amount of fertilizer used per acre of grassland (which amounts to 40% of England's agricultural area) is taken as 100 in U. K., it is 424 in Belgium, 274 in Holland, 231 in Norway, and 168 in Denmark. The Ministry of Agriculture estimates that U. K. falls short of optimum usage by 100% for nitrogen, 20% for phosphorus, and 45% for potash.

U. K. production of nitrogen was heavier last year than ever before and was more than 2.5 times as great as before the war. Phosphates (in terms of P_2O_5), which had suffered sharply in the off-years of '51 and '52, approached the record production that occurred in 1949–50. Production of superphosphate follows the trend established by total phosphates.

The intensive diversified agriculture of U. K. calls for a high rate of application of nitrogen, phosphates, and potash. In

Trends of Fertilizer In U. K.
Output ■ – Consumption ≡

(ALL FERTILIZER IN TERMS OF PLANT FOOD) [a]



Source: Commonwealth Agriculture Commonwealth Economic Committee, London, 1955

a/ Data for year ending in June of year shown