

ing a third season. Therefore, the rig must earn 50% of the purchase price each year for depreciation. Secondly, the company finds delivery, haul-back, and maintenance total about \$1000 a year. This, coupled with the \$1000 depreciation, means rent must cover the full purchase price each year. If the rig can get in a full 5000 acres at 40 cents per, the company breaks even. Such optimum conditions seldom prevail in this company's experience, and it actually loses on the average at least \$6.00 above the return by rental on every ton of fertilizer sold and applied.

Faced with a two-year service life for equipment, this California company strongly recommends the declining balance, three-year write off permitted for new equipment in computing taxes. (On a \$2100 unit, amortization will be \$1400 the first year, \$467 the second, and \$233 the third.) Only in this way does it feel it can come close to breaking even on equipment costs.

Reaction in western liquid fertilizer circles to the foregoing figures is mixed. Several companies—both equipment manufacturers and operating fertilizer companies—substantiate the “40 cents, 5000 acres” as an average maximum for one season for the rig in question. At least one equipment manufacturer, however, believes these figures should be closer to 50 cents and 10,000 acres. This company also takes exception to an indicated two-year useful life for injection equipment, believes it should be at least five years.

Equipment Purchase: Buy or Lease?

A second problem facing liquid fertilizer companies is equipment purchase. If the company lacks sufficient working capital to pay cash—and many newcomers are apt to be in this position—it must find a credit source. Traditional approach, and one recommended by many established formulators, is through the local bank. Common terms are 25% down and the balance in one or two years (or more, depending on loan size). Interest averages 5 to 6% a year on the amount borrowed. Where a large company establishes a dealership organization, it may lend its credit position to secure a lower down payment for dealers, such as 10% down and the balance in 36 months.

On the theory that formulators or dealers can profit by conserving working capital with a lower down payment and get a more extended line of credit by not having a note appear on

the books as a liability, at least one western equipment manufacturer is promoting a lease arrangement whereby the prospective buyer needs less cash to get the use of equipment. Such leases are written for two years with an option to renew for three, or vice versa. In either case, at the end of the original lease period, the lessee can return the equipment, renew for the proper option period, or purchase the equipment at the then current market value. With either sequence of lease period, the lessee pays four months' rent in advance, amounting to a “down payment” of nearly 17% on the two year option, 11% on the three. Typical payment for \$25,000 worth of equipment on a two-year-lease, three-year-option is \$1237.50 a month. If the option to renew is exercised, payments are about \$5.60 a month for each \$1000 worth of equipment rented.

With these equipment management problems in the background (or foreground, depending on your view), it is not too surprising most in the liquid fertilizer industry are lending support to farmer ownership of equipment. National Nitrogen Solutions Association, for instance, is actively working with equipment manufacturers to develop new applicators and standardize fittings. National raw material suppliers, such as Allied Chemical & Dye's Nitrogen Division, devote ads in farm papers to promote farmer ownership.

Equipment manufacturers themselves support the trend to varying degree. Some, such as California's Fabricated Metals, still confine sales to formulators and dealers but acknowledge farmer ownership is probably coming. Indication of how formulators and dealers will promote this ownership comes from John Blue Co. (Huntsville, Ala.). General Manager W. D. Tucker puts it this way: “We are firmly convinced distributors and manufacturers will intensify sales efforts on equipment. In some instances they will sponsor their own brand names and in others sponsor equipment already manufactured by companies such as ours.”

A word of caution comes from one prominent company, however, which “feels quite strongly that liquid fertilizer application can best be controlled by the dealer because the industry is still in its infancy, and custom service or supervised application by the sales organization is paramount.” To this end, many of this company's dealers discourage use of custom applicators, and they retain a service relationship on those accounts where a farmer owns his own equipment.

Urea-Forms

Slow release nitrogen products find sizable market for use on turf and ornamentals; lower price key to expanded use

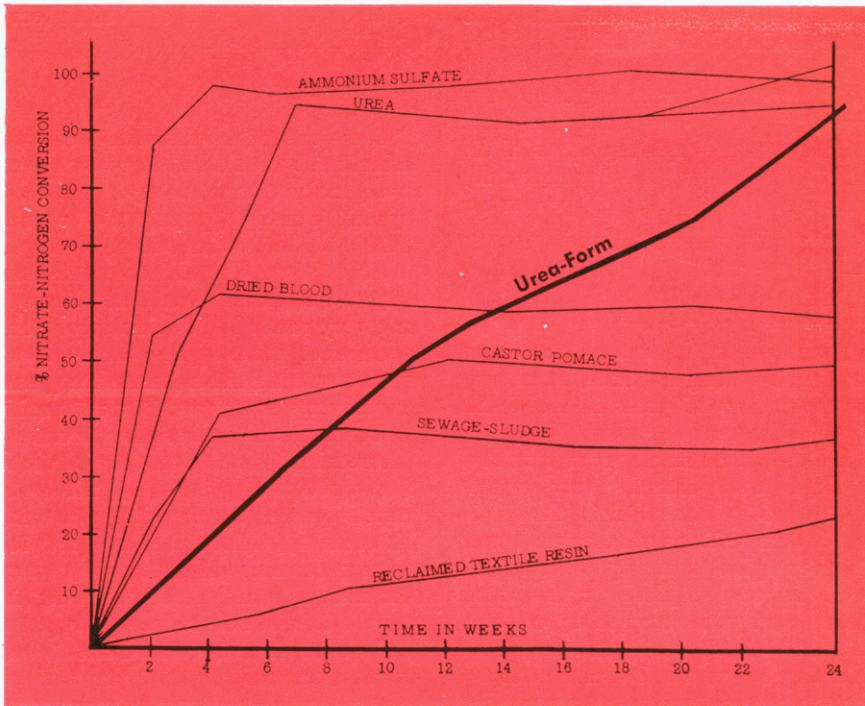
THE UREA-FORMALDEHYDE fertilizer products hit the commercial market only last year, but already promotion is being stepped up and industrial sources are forecasting greatly increased use this season. Advantage of the urea forms is that they have low initial solubility and release nitrogen slowly for a prolonged period; the problems of burning and leaching are eliminated. So far price has ruled out most applications other than to ornamentals and turf.

Technically the urea forms have been defined as mixtures of polymethyleneureas which exhibit urea-formaldehyde mole ratios greater than 1, nitrogen contents in excess of 37%, low solubilities in water and organic solvents, and lower rates of nitrification in soil media than the more soluble forms of chemical nitrogen fertilizers.

Development of these newly marketed compounds dates back to pre-world war II days. The USDA in collaboration with chemical companies producing urea-formaldehyde resins did the early field testing. Later, pioneering work was done on turf grasses at Penn State University and on ornamentals at Rutgers and the University of California. In 1946, trials were conducted by the North Carolina Agricultural Experiment Station on field and plant bed tobacco.

The fertilizer products differ from the highly insoluble plastic resins in that a higher ratio of urea to formaldehyde is used in the fertilizers. Quality measurement is of particular importance. Recognizing this the AOAC last year announced a new method for determining the nitrogen activity index of urea-forms. The activity index, arrived at by routine chemical methods, correlates closely with the wide spread greenhouse and field tests.

The reaction of urea with formaldehyde must be closely controlled to produce a polymer in which the nitrogen will be mineralized at a desirable rate when the polymer is added to soils under favorable environmental conditions. Transformation of urea in soils is a biological process depend-



Comparative curves developed by Woonsocket in testing the nitrogen availability of various materials. Company's urea-form is now being marketed as Nitroform

ent upon several soil factors. However, the urea forms have been found generally satisfactory in all soil types. While enzymatic activity is essential to nitrify urea-form materials, it is not essential to have an exceptionally high microbial development in the soil. Only a normal and even a low microbial activity will satisfactorily nitrify urea-form materials.

Allied Announces U-F Solutions

Early last month Allied's Nitrogen Division announced a new urea-formaldehyde solution from which formulators can produce granular-type fertilizers containing the slow release nitrogen. Trade named N-dure, the solution produces complete fertilizer mixtures but requires only standard ammoniation apparatus. A separate spray pipe in the mixer is used to introduce the N-dure into the superphosphate and other dry ingredients. This is done before introduction of the ammoniating medium.

N-dure contains only 12% nitrogen and consequently, in a strict technical sense, does not qualify as a "urea-form." But its mode of action is the same and it is certainly destined to be a factor this season in solid urea-form's market picture.

Feature of the liquid product, say Allied officials, is that it allows manufacturers, for the first time, to make mixtures containing a wide variety of ratios between water soluble and insoluble nitrogen. N-dure is being shipped in insulated steel tank cars

from the Nitrogen Division plant at South Point, Ohio.

Basic producers of the urea-forms today include: Du Pont with Uramite; Borden with Borden's 38; Woonsocket Color & Chemical with Nitroform; and Swift in Golden Vigoro.

Du Pont announced Uramite in June of last year. But development had been under way since 1938. Pilot scale production was used for exhaustive field tests in all regions of the country. New plant facilities were constructed at Belle, W. Va., to produce it.

Borden's 38 is being sold in 50- and 25-pound bags, 5- and 1-pound cans and even a 2.5-ounce shaker. Company spokesmen say cost of nitrogen is no more than cost organic fertilizers containing only 3 to 7% nitrogen.

Woonsocket Color & Chemical is offering urea-form both to the fertilizer trade for use in specialty mixes and to retail and consumer trade. The inclusion of the urea-form in mixed fertilizer goods will actually be quite a boom to this industry since it will now be possible to turn out extremely safe high analysis products, says a Woonsocket executive.

Swift's fertilizer product, Golden Vigoro, containing urea-form has been on the market for over a year. In the Swift process the urea-formaldehyde reaction is understood to take place right in the mixture.

The urea-forms are still too costly for widespread application. However, informed opinion is that with further progress in manufacturing techniques

and with anticipated higher volume of sales the unit price of nitrogen from urea-form will be greatly reduced.

In California alone for just the turf and ornamentals market one experiment station official estimates an annual requirement of some 1000 tons of the urea-forms.

One producer confidently predicts that once the unit price of nitrogen from urea-form reaches a competitive position with natural organic nitrogen, the urea-forms will take over the vast majority of the market. This market could approach the staggering annual figure of 420,000 tons of nitrogen.

Some sources are classing development of the urea-forms as one of the greatest advances in fertilizer manufacture since the development of superphosphate. While this may be open to debate, there is no doubt that the urea-forms are potentially important to the fertilizer industry.

Colchicine in Agriculture

Drug provides potentially valuable tool for breeding crops with unusually large fruit, flowers, and seeds

COLCHICINE, a drug known for at least 35 centuries and used originally in the treatment of rheumatism and gout, is finding increasing application today in experimental plant breeding. Of special interest to growers, colchicine, an alkaloid derived from the crocus-like plant *Colchicum autumnale*, may profoundly alter the biological makeup of plants. In some cases, the result may be larger fruit, larger flowers, larger leaves, larger seeds. Fruit, for example, may possibly be produced in increased yield, with better flavor, greater nutritional value, greater disease resistance. By the action of colchicine, sterile hybrids may in some cases be made fertile.

Although colchicine can possibly produce changes of this type, the results thus far have fallen short of original expectations. Some early writers, confident in colchicine's ability to work biological miracles, were freely predicting that the drug would create an agricultural revolution. This, obviously, has not been the case.

In many instances, the disadvantages in using colchicine in plant breeding far outweigh the advantages