rials moving in plants, providing agriculture with new and yet undeveloped possibilities. Application is being made in North Russia where poor quality of potatoes has been a problem. Here the products of CO_2 assimilation move from leaves to stems and growing apices, causing slow and retarded flow of nutritive substances to tubers and excessive stems and leaves. Isotopic indicators are being used to determine efficiency of measures being studied to overcome the low-starch potatoes resulting.

Labelled atoms have also been used to study the effect of special chemical preparations, such as 2-4-dichlorophenoxyacetic acid, methyl ether of α-naphthylacetic acid, and 4-iodophenoxyacetic acid on plant growth and formation processes. Other work has led to better understanding of detoxication of alien substances in body of plant. Russian scientists have also shown that radioactive rubber appears in the latex of the plant, kok-saghyz, shortly after introduction of solution of carbon-14–labelled sacchrose, indicating that rubber originates from carbohydrates.

Fertilizer Situation

USDA report indicates nitrogen consumption up 7% last year . . . U. S. to become net exporter of potash for first time next year

Supplies of the three principal plant foods in the 1955–56 fertilizer year will probably exceed the 1954–55 supply by about 2.5%, according to USDA's "Fertilizer Situation" issued last month. This is based on existing rates of production and trends in usage and foreign trade rather than on a capacity to produce fertilizer, says the report.

Here's the USDA expectation for each plant food.

Nitrogen. About 2.35 million tons available for fertilizer, based on rates of production and usage trends, a 4.4% increase over 1954–55.

Phosphate. Available phosphoric oxide is forecast at 2.3 million tons, approximately the same as 1954–55.

Potash. Forecast of available supply as potassium oxide is estimated at 1.94 million tons, an increase of about 4.3% over 1954–55.

In the case of each plant nutrient, USDA emphasizes that its estimate is not based on ability to produce and that if demand arises much larger supplies can be produced, providing that the extra demand does not occur during the spring rush.

Increased tonnages of nitrogen are expected in every category except ammonia for mixing and direct application. Ammonia, both anhydrous and aqua, for direct application is expected to hit 460,000 tons this year, compared with 414,000 tons last year, a better than 11% increase. Urea, reported for the first time this year now that four companies are producing it, is expected to jump some 30% to 50,000 tons, but the biggest increase is expected in nitrogen solutions for direct application—from 35,000 tons to 50,000 tons. Nitrogen exports are also due for an increase, according to USDA, from 155,000 tons in 1954–55 to 198,000 tons this year, with a decline in imports anticipated—from 408,000 tons to 381,000 tons. Biggest part of the export gain is expected in ammonium sulfate and ammonium sulfate-nitrate, compound solutions for mixing, and other solid forms such as ammonium phosphates, sodium nitrate, cyanamid, etc.

According to USDA figures, a round 2 million tons of nitrogen was consumed for agricultural purposes during the year ended last June 30. This was a 7% increase over the previous year's 1,847,416 tons, and not up to the average annual increase in recent times of 10%.

Total apparent consumption of nitrogen for all uses, less imports amounted to 2,337,206 tons, or about 70% of the nation's capacity to produce nitrogen on July 1, 1955.

Phosphate Expansion

Productive capacity of phosphates is expected to add another 250,000 tons in 1955–56, and a considerable part it will be in the form of ammonium phosphates, says USDA. Between Jan. 1, 1952, and July 1, 1955, the nation's ability to produce concentrated superphosphate increased by 187%, while normal

U. S. PLANT FOOD SUPPLIES

(In thousands of tons of N, P_2O_5, and K_2O)

	Nitrogen		Phosphorus		Potassium	
Year Ended:	June 30, 1955	June 30, 1956	June 30, 1955	June 30, 1956	June 30, 1955	June 30, 1956
U. S. Production	1997	2167	2411	2445	1821	1947
Exports	155	198	169	210	97	146
Imports	408	381	70	65	141	138
Net Supply	2250	2350	2312	2300	1865	1939

NITROGEN CAPACITY AND CONSUMPTION

(1000 tons of N)

Region	Production Capacity (as of July 1)				Fertilizer Consumption (year ended June 30)	
	1954	1955	1956	1957	1953	1954
Eastern	791	898	1062	1097	492	518
East North Central	380	472	652	653	239	261
West North Central	188	301	359	452	180	266
East South Central	250	372	408	500	256	263
West South Central	789	949	949	950	151	182
Western	210	297	485	680	266	299
Territories	1	1	1	35	53	58
Total U. S.	2609	3290	3916	4367	1637	1847
Eastern Canada	139	162	204	290	29	30
Western Canada	167	177	190	219	15	12
Grand Total	2915	3629	4310	4876	1681	1889

superphosphate increase 4% and miscellaneous phosphates (ammonium phosphates, liquid phosphoric acid, and other phosphates applied directly to the soil) increased 52%.

A boost in exports is also in store for phosphates during the coming year, the USDA reports, from 169,000 tons in 1954–55 to 210,000 tons in 1955–56. Meanwhile, imports are expected to decrease by 5000 tons to 65,000 tons.

U. S. to Become Net Exporter of Potash Next Year

The U.S. may become a net exporter of potash next year for the first time if USDA predictions hold up. Since the first World War, when the U. S. began producing potash, exports from this country have carried little weight in foreign markets, for the U. S. still depended to some extent on imported potash from Europe. Now, as predicted earlier this year (AG AND FOOD, July, page 559), the U. S. and the North American continent are in a position to wrest control of the international potash markets away from the European cartel. According to the USDA figures, the U. S. will export 146,000 tons of potash (on a K_2O basis) next year and import 138,000 tons leaving the U. S. a net exporter of 8000 tons. Not a large figure, the 8000 tons, but it does indicate that balance of power in potash is not stalemated.

Ultrasonics

New technique seeks — and probably will find — food processing jobs, but currently suffers from under-development, over-promotion

"BEFORE the industrial application is made, more research work must proceed to determine the best conditions, technical as well as economical, for the application of such processes." This recommendation for caution, coming from a scientist who has performed considerable research with both experimental and commercial equipment, is probably a fair summary of scientists' estimation of a new food processing tool—ultrasonics.

For in the ultrasonics field, as has often been the case in other fields, the business seems to be getting ahead of the science. Equipment which has been found empirically to do certain jobs is already being merchandised—sometimes with more enthusiasm than is warranted by actual test results—while even the acknowledged experts are not certain as to exactly what the equipment is doing, and more particularly, why.

It has been known for a quarter-century that microorganisms in liquids could be killed by exposure to high-frequency sound waves; ultrasonics can in some cases also contribute to emulsification, flavor extraction, and other food processing operations. But there are numerous obstacles to overcome. In sterilizing foods, for example, treatment would be limited to nonparticulate matter, since ultrasonic waves cause disruption of organized matter in liquids. There would be little point in sterilizing noodle soup via ultrasonics, only to find that the noodles were completely disintegrated! Barrier effects of packaging materials also are a stumbling block, militating against in-package sterilization.

These and other drawbacks notwithstanding, scientists are not entirely pessimistic concerning a commercial future for ultrasonics in food processing. They do feel, however, that too little information of a fundamental nature is yet available, and that current promotional efforts in the commercial area, are in some cases perhaps, over-zealous. They point out in particular that present commercial equipment generally does not provide quantitative control, and in many cases does not even provide a means of measuring the level of energy output. In strictly mechanical operations, of course, the need for precision control is not always great, but for such applications as sterilizing milk, accurate control to assure quantitative results is imperative.

The Dim View

Not all investigators agree that sterilization of foods is a suitable field for ultrasonics. Stanley R. Rich of General Ultrasonics takes a dim view of ultrasonics in this application, having found in earlier (unpublished) investigations with chocolate sirup that, at the cavitation level, ultrasonic vibrations actually increased the growth of thermophilic spores; chocolate milk made from the treated sirup showed bacteria counts,

Ultrasonics equipment produced by Curtiss Wright can be used in the extraction of substances from hops for use in the brewing process