Output of inorganic nitrogen by the air-fixation process in the United States was 84,000 tons in 1929, as compared with 26,000 tons in 1928 and 5,900 in 1923. The output for 1930, according to more recent data, is given at approximately 140,000 tons. These figures may be usefully compared with the output of by-product nitrogen, which was 187,600 tons in 1929, 170,000 tons in 1928, and 123,500 tons in 1923. Inorganic nitrogen is obtained from three sources, viz., imports, the by-product process, and air fixation. The foregoing figures show the rapid relative advance of air fixation. Domestic production in 1926 furnished 60.5% of our supply of inorganic nitrogen, as compared with 49.5% in 1923.

One of the most modern of the processes now in use for the fixation of atmospheric nitrogen is that employed at Hopewell, Virginia, where America's largest air nitrogen plant is located. This plant makes not only ammonia but also nitrate of soda, which is produced in white, granular crystals containing 16% available nitrogen and which is dried to contain less than 0.2% moisture. It is recommended by state and federal agricultural authorities for top-dressing and side-dressing purposes and for mixing in complete fertilizers on the same basis as other nitrate of soda.

The accompanying diagram (Fig. 1) shows the principal steps in processes for the fixation of nitrate of soda.

MAGNESIUM—A POSSIBLE KEY TO THE PHOSPHORUS PROBLEM IN CERTAIN SEMI-ARID SOILS

In recent years, it has been found that some soils of North Dakota respond favorably to phosphate fertilizers while others do not, even though crop yields be low and the content of readily available phosphorus be no more, or even less, than the responsive soils. Recent greenhouse trials with barley on a Fargo clay soil which has grown wheat continuously for 40 years, with nothing returned, have indicated a large response to magnesium oxide. The plants receiving magnesium oxide headed two weeks earlier, had more tillers, larger and stronger straw, and much larger heads of grain than other plants. Lime and other materials containing nitrogen, potassium, and phosphorus gave only small increases in comparison. Although this soil has been cropped to wheat continuously for 40 years, it is not infertile as indicated by the fact that for the past 14 years yields have averaged about 16 bushels per acre and the present supply of readily available phosphorus is high. A further experiment with a similar Fargo clay which has been cropped to a rotation with residues returned shows a like response to magnesium oxide.

It is well known that magnesium is an essential element and that one of its functions is in connection with phosphorus nutrition, probably as a phosphorus carrier. It may not be necessary that phosphorus enter the root as magnesium phosphate, but its movement and especially its final delivery at the point of utilization within the plant are more effective and rapid if in that form. During the ripening period phosphate is deposited in the seed as magnesium phosphate so that the young plant will have phosphate in a form immedi-