Lime Requirement of Soil.

A SURVEY of the results from liming experiments in progress during the last twenty-five years at the Tennessee Agricultural Station was given by Prof. C. A. Mooers in his address as vice-president of Section O (Agriculture) of the American Association for the Advancement of Science at the recent Des Moines meeting, and has now appeared in *Science*, vol. 71, p. 81. The investigations have been carried out in the laboratory in conjunction with open air lysimeters of two types, one containing surface soil only, the other having in addition an under layer of heavy loam subsoil.

One of the early discoveries was the fact that silica readily combined with carbonate of lime with the formation of calcium silicate, a form of calcium more suitable for clovers than the carbonate. The idea that lime exerts a 'burning' effect on soil humus has been refuted, neither calcium oxide nor hydroxide producing increased oxidation until their conversion into carbonate or silicate, and even then the increase was temporary only. As regards base exchange, the generally accepted view that potash is liberated by liming is shown to be erroneous, a normal application of lime actually repressing the leaching of this element.

Concerning the relationship between calcium and magnesium, new light has been thrown on many of the older studies. Liming with burnt lime or high calcic limestone was found to increase the calcium and depress the magnesium outgo, whereas additions of magnesium had the reverse effect. Treatment with a calcium-magnesium compound such as dolomite had the same result as the addition of magnesium only, these findings explaining the harmful action of high calcic limes on a magnesium-loving plant such as tobacco.

The question of the effect of liming on the oxidation of soil sulphur and nitrogen is also discussed, and the availability of added lime shown to decrease with time. The chief discovery made at the station, however, is the formation of ternary systems such as $CaO\text{-}Al_2O_3\text{-}CaSO_4$ by the action of aqueous solutions of calcium hydroxide and sulphate on aluminium complexes. Such systems are of low solubility when alkaline, but readily soluble in neutral or acid media. The reaction can be used to determine the reactive amount of alumina and silica, and is promising as a method for measuring the colloidal properties of a soil. It has already proved invaluable in affording an explanation of the disintegration of concrete under certain conditions which can now be avoided.

In conclusion, Prof. Mooers emphasises the importance of lysimeter experiments for both the chemist and plant physiologist.

Prickly-Pear Control in Australia.[1]

THE attempt that is being made to control the prickly-pear menace in Australia by biological means is a practical experiment of great interest and importance. The initiation and progress of this work has already been referred to in the columns of NATURE, and the most recent report on the subject has lately come to hand.

Since the year 1925, the measures taken to combat the scourge have greatly reduced, if not entirely arrested, its yearly spread to uninfested territory. The policy of the Prickly-Pear Board has been to introduce and acclimatise insects inimical to the growth of all the naturalised species of this plant. In carrying out this scheme, the natural enemies of prickly-pear in North and South America have been continuously investigated since 1920, and a number of species introduced, under adequate safeguards, into Australia. The cochineal insect, *Dactylopius tomentosus*, is now so widely diffused that there is scarcely an area of prickly-pear in Queensland or New South Wales which is not infested by this insect. The plant-sucking bug, *Chelinidia tabulata*, has multiplied and spread in enormous numbers, and the red spider, *Tetranychus opuntiæ*, gives every promise of soon extending throughout the length and breadth of the prickly-pear area. The moth *Cactoblastis cactorum* is a more recent introduction; about 300,000,000 have been liberated since 1926, and it is believed that within two or three more years it will become general in the desired areas. It is estimated that 30,000 acres of prickly-pear have been destroyed by this insect in about the last twelve months.

In this manner a complex of insect enemies has been established. Some species have naturally proved more successful than others, and their combined efforts are already bringing about a considerable measure of control of this pest plant. Its reduction is most noticeable in certain scrub areas where it once formed a barrier impenetrable to animals. In the heart of the infested country it is now possible to travel for 100 miles without seeing any flourishing plants. The production of fruit and new growth has become greatly diminished, fewer seedlings are able to become established, while large clumps of plants are being gradually sapped and destroyed.

On present indications, it is reasonable to expect that vast areas of prickly-pear will be freed within a few years. Too much confidence of complete eradication is to be deprecated, as the problem has not yet been solved, but the future prospects give reasons for optimism. The experiment has not yet had a long enough lease to enable an estimate to be made of the possible influence of such factors as varying or extreme fluctuations of climate, disease, and native insect parasites on one or other species in the complex that is being built up. Indigenous parasites and predators have indeed turned to some of the introduced insects but, up to the present, the influence they have exerted has not appeared to be great. Although such enemies need close observation being kept on their activities, there is no need for premature or undue alarm that they will materially vitiate the good results that are being achieved. A. D. I.

[1] "The Progress of the Biological Control of Prickly-Pear in Australia." By Allan P. Dodd. 44 pp. Commonwealth Prickly-Pear Board, Brisbane. 1929.

University and Educational Intelligence.

CAMBRIDGE.—The Cavendish professor has announced that the first course of Scott Lectures will be given by Dr. Niels Bohr at the Cavendish Laboratory at 4.45 P.M. on May 12, 14, and 16. The subject will be "The Principles of Atomic Theory".

OXFORD.—Discussion still continues on the proposal to use the sum of £100,000 realised by the Radcliffe Trust for the establishment of an astronomical observatory in South Africa. The advocacy of the scheme by Prof. H. H. Turner is criticised by Prof. Lindemann on various grounds; he doubts, for example, whether any special benefit would result to Oxford in relation to other centres of astronomical study. Moreover, the climate of Oxford is not conspicuously worse than that of Greenwich, Edinburgh, or Cambridge; while even if it be allowed to be unsuitable for 'positional' astronomy, there are many other lines of astronomical and meteorological research which are in need of assistance, and could well