

of the work in other departments of the Institute is conducted with particular reference to conditions obtaining in South Australia, but results of investigations have a Commonwealth-wide significance.

Some of the work already completed such as that concerning the application of nitrogenous fertilisers to stubble-sown cereal crops; the seeding of permanent pastures, and the addition of manganese sulphate to soils previously incapable of growing normal crops of oats and barley, has already been applied in the agricultural areas of the State. In the future improved varieties of wheat of high milling quality, and select bred strains of immotant pasture plants will be available for specific localities.

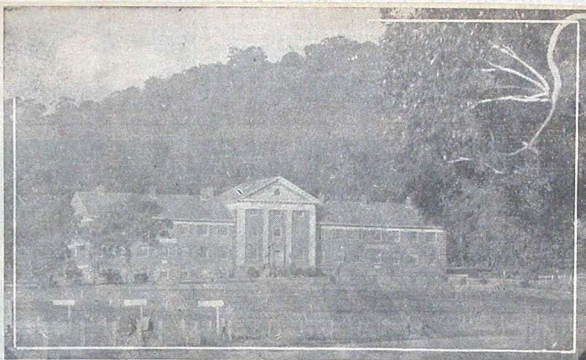
The most important work in progress is the gradual accumulation of knowledge which enables agricultural and pastoral problems to be better understood, and which provides the basis for sound development.

ARISING out of the cereal work it has been demonstrated that striking increases in yield may be obtained by the application of sulphate

of ammonia to barley and oats on stubble land. Until recently superphosphate was the only fertiliser widely used

in cereal culture. Past investigations were largely confined to wheat sown on fallow land, and had demonstrated that superphosphate was indispensable for economical cereal production. Nitrogenous fertilisers, on the other hand, had produced little or no response when applied to fallow-sown crops. It became generally accepted that nitrogenous fertilisers were of little or no value for cereal cropping under Australian conditions.

Investigations in the experimental fields at the Institute showed that nitrogen gave a marked response on stubble-sown cereals—an even greater response than phosphates. This led to a systematic investigation of the effect of nitrogenous fertilisers on wheat, oats, and barley grown on stubble land. Results show that under the conditions prevailing at the Institute, the effect of nitrogenous fertilisers, particularly on barley and oats grown on stubble land, was most



This photograph, taken by Prof. H. J. Wilkinson, shows the picturesque building of the Waite Research Institute in its charming setting among the foothills at Fullarton.

were made of all pasture species and strains likely to be of use under South Australian conditions. These included tests with native plants from all States, and introduced plants from many overseas countries. This work eliminated a large number of possible pasture species, and narrowed the list of likely plants to a comparatively small group. These have been subjected to field tests under grazing conditions in various country districts.

Through this work it has been possible to lay down seeds mixtures and methods of establishment for the Adelaide Plains, hills district, Murray swamps, and the South-East. The results of this work have indicated the value of associate grasses such as Wimmera ryegrass, Phalaris Tuberosa and perennial ryegrass with subterranean clover, the blending of lucerne with pasture grasses in seeds mixtures, and the use of early maturing varieties of subterranean clover, which has enabled this clover to be

settlements in the State have been completed with the exception of Walkerie, and use is being made of the maps and analyses for a variety of purposes including irrigation and drainage requirements. This work on irrigation areas is at present being conducted at Wentworth and in the Murrumbidgee areas in New South Wales, and when these are completed much similar work remains to be performed in the Mildura district. The surveys in New South Wales are of importance in the re-adjustment of living areas and in the reorganisation of irrigation methods.

An interesting investigation of the moment is a soil survey of the group settlements in the neighborhood of Denmark, Western Australia, where the division is co-operating with the Department of Agriculture in the study of the soils associated with a wasting disease that has made dairy

phase of the work is the inclusion of resistance to disease and good baking quality in the new high yielding wheat varieties.

A number of strains combining good baking quality with high yield have been produced, and promising strains combining rust resistance, milling quality, and yielding capacity are now under test in the mallee and central districts, as well as at the Institute. Some idea of the amount of work involved in the wheat breeding programme may be gained from the fact that 23 miles of hand-sown rows and 177 field drill plots of wheat have been sown in the cereal tests during the present season.

The production of early maturing strains of field peas, in which the early flowering habit of Brunswick White is combined with the higher potential yielding capacity and resistance to shattering of other varieties, is in progress.

INVESTIGATION of insect pests affecting the welfare of the agricultural and horticultural industries forms a prominent part of the

mate and weather has been shown to exercise an important effect in the fluctuations in insect numbers.

In its researches into plant diseases the work of the Institute has been concentrated on counteracting take-all in wheat. Valuable discoveries have been made in this sphere, particularly in regard to secondary infection during spring, and the influence of soil type on the incidence of the disease.

Detailed investigations are at present in progress on the older mallee soil type at Roseworthy and in the newer mallee areas at Karoonda. The principal objective of this work is to elucidate the question of soil antagonism throughout the entire period of growth of the wheat plant. The longevity of the fungus in the soil is also being tested at various centres.

Recently the cause of die-back in apricot limbs was investigated. It has been proved that this is due to fungus attack. The life history and means of spread of the fungus is being studied with a view to its ultimate control.

A FURTHER important phase of the work at Waite Institute is the investigation of physiological relationships of crop plants. Knowledge obtained enables processes which occur

in both healthy and diseased plants to be more fully understood. It is known that additional supplies of both phosphates and nitrogen favorably affect plant growth and yield, but little is known of the precise manner in which these constituents increase production. Recent work has shown that the water content of the plant affects its nitrogen compounds. The changes in these compounds may have an important bearing on drought resistance and in the ripening of crops.

The State's greatest asset of a material character is its moderate to good rainfall districts. The future prosperity of the State is largely dependent on the extent to which these lands can be made fully effective. The application of scientific methods and intensive production to these areas offers a means of increasing the value of the assets on which so much loan money has been incurred for development.