

REGIONAL AGRICULTURAL LABORATORIES IN THE UNITED STATES

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IMPERIAL BUREAU OF PASTURES AND FORAGE CROPS

DURING the past five or six years, a major development has been taking place in agricultural research in the United States, which should have a considerable effect on the rate of progress to be expected in several important problems, and on the number and scope of scientific papers published.

This development may be said to have originated officially with the signing of the Bankhead-Jones Act by President Roosevelt on June 29, 1935. This Act provided for substantially increased Federal aid for fundamental agricultural research, agricultural extension and land-grant college instruction.

The appropriations granted by Congress were 980,000 dollars for land-grant college instruction, 8,000,000 dollars for agricultural extension, and 1,000,000 dollars for agricultural research; under a sliding-scale arrangement these amounts might be increased to an annual maximum of 19,480,000 dollars by the beginning of the fiscal year 1940.

As regards agricultural research, the Act contemplated enlarged activities by both the State experiment stations and the Federal Department of Agriculture. Sixty per cent of the amount provided was to be available to the States of the Union, and Alaska, Hawaii and Puerto Rico, the funds allotted being based upon the respective rural populations, and being conditional upon the provision from non-Federal sources of an equivalent amount for purposes of research and for the establishment and maintenance of necessary facilities for the prosecution of such research.

The remaining forty per cent of the research fund was placed directly at the disposal of the Secretary of Agriculture, who was "authorized and directed to conduct research into laws and principles underlying basic problems of agriculture in its broadest aspects; research relating to the improvement of the quality of, and the development of new and improved methods of production of, distribution of, and new and extended uses and markets for, agricultural commodities and by-products and manufactures thereof; and research relating to the conservation, development and use of land and water resources for agricultural purposes" (*Experiment Station Record*, 73, No. 3, 289-91; 1935).

This research was to be conducted by such agencies of the Department of Agriculture as the

Secretary might design or establish, but one half of the special research fund was ear-marked to be "used by the Secretary for the establishment and maintenance of research laboratories and facilities in the major agricultural regions at places selected by him, and for the prosecution . . . of research at such laboratories" (*loc. cit.*).

All research by the Department authorized under the Act was to be additional to any provided by existing law, but the desirability of co-ordination of activities was particularly stressed.

So far, nine of these special regional laboratories have been organized, each one being regarded as a co-operative enterprise between the various States concerned, serving as a focal point for co-ordinating and integrating research in its particular problem in its own region, and carrying on basic research along certain lines not already provided for adequately. One of the important reasons for criticizing the organization of agricultural research in the United States, namely, the fact that the agricultural experiment stations of adjacent States situated in the same geographical or agricultural region were carrying out research on very similar problems with little co-ordination as between States, has now to a great extent been removed.

As will be seen from the account of the scope and location of the new regional laboratories given below, anything from eleven to twenty-five States are now co-operating with one or other of the laboratories; the boundaries of a particular problem or branch of agricultural research no longer coincide with State boundaries, but with the limits of the region to which the problem applies more particularly.

The fundamental research for which specialized staff or special equipment or laboratories are essential is done at the regional laboratories; the research which can be carried out at the State experiment stations is still done there; but it is now closely correlated with the work at the regional laboratories, and duplication of work between any of the co-operating States is avoided.

These laboratories are, of course, quite distinct from the other experiment stations and laboratories which have been located on a regional or "problem area" basis, such as the soil and water conservation experiment stations and hydraulic laboratories of the Soil Conservation Service, or the forest and range experiment stations of the Forest Service.

The regional laboratories concerned with research on crop plants and products are three in number ; four deal with animal problems, and two with soil-plant relationships.

The U.S. Regional Vegetable Breeding Laboratory (Director : Dr. B. L. Wade) is at Charleston, South Carolina, and was established to obtain the fundamental information necessary for the breeding and development of improved types and varieties of vegetable crops specifically adapted to the south-eastern region ; thirteen States are co-operating with this laboratory.

The Pasture Research Laboratory has been established at State College, Pennsylvania, to carry out research on the more fundamental pasture problems of the north-eastern States, the twelve co-operating States continuing to make experiments on the more agronomical aspects. A description of the organization of this Laboratory and of the way in which it co-operates with the States concerned has already been given by its director, Dr. R. J. Garber (*Herb. Rev.*, 6, 146-50 ; 1938).

The twelve States of the North Central Region are co-operating with the U.S. Regional Soybean Industrial Products Laboratory which has been established at Urbana, Illinois (Director : Dr. R. T. Milner), (1) to develop industrial uses for the soybean and soybean products, (2) to study the effects of different processes on the quantity and quality of products obtained from the soybean, and (3) to provide facilities for testing the quality and adaptability of types and varieties of soybeans for industrial uses.

The four animal laboratories deal with sheep, swine, poultry and animal diseases.

The purpose of the Western Sheep Breeding Laboratory, Dubois, Idaho (Director : Mr. J. E. Nordby), is the development of strains of sheep superior to those now in existence as regards hardiness, and yield and quality of wool and lambs, and the co-ordination of this research with that of the co-operating States (twelve) and Federal experiment stations.

The U.S. Regional Swine Breeding Laboratory has been established at Ames, Iowa (Director : Dr. W. A. Craft), to study the improvement of swine by the application of breeding methods (thirteen States in the North Central Region co-operating).

The object of the Regional Poultry Laboratory, East Lansing, Michigan (Director : Mr. Berley Winton), with which twenty-five States in the North Central and North-eastern Regions are co-operating, is to determine the etiologic agent or agents responsible for fowl paralysis, to develop procedures based upon genetics, management and nutrition, and to discover prophylactic measures for the prevention or control of this disease.

Related to this last laboratory is the work of the Regional Laboratory for Animal Disease Research, at Auburn, Alabama- (Director : Mr. B. T. Simms). This Laboratory was established to obtain, with the co-operation of the thirteen States of the South-eastern Region, fundamental information of the mechanism of infection (infection, resistance, immunity) in the contagious, infectious and parasitic diseases of animals and poultry, in order that methods of control of these diseases can be developed or improved. The Laboratory is studying Johne's disease and coccidiosis and internal parasites of cattle.

A Regional Salinity Laboratory, at Riverside, California, has as its objective the obtaining of new information on the reactions of plants and the soil to known concentrations of the several constituents of the dissolved salts contained in supplies of irrigation water and in the soil solutions of irrigated lands. The Laboratory will also ascertain the hydrological and salinity conditions, and the trend of these conditions in representative areas of irrigated lands, in order that the results of these investigations may be constructively applied. Eleven States in the Western Region to which these problems apply are co-operating with this laboratory.

Finally, there has been established at Ithaca, New York, the U.S. Regional Plant Soil and Nutrition Laboratory (Director : Dr. L. A. Maynard), which has very extended terms of reference and the possibility of results which will ultimately have a direct application to the nutrition of domestic animals and the human population throughout the United States.

This laboratory has the following objectives :

(1) To investigate the possibility of influencing the type, character, composition and health of plants grown under controlled environments and in the field through the application of common, rare, or trace elements, irrigation water, sprays, or other means.

(2) To investigate under such conditions the range of variability in the amount of crop produced, the structure of the plant tissue, its mineral, organic and fibre content, and the influence of various environments and environmental factors upon vitamins, growth-promoting substances and other dietary supplemental factors.

(3) To test objectively all these values by feeding the plant produced to the usual laboratory test animals and making observations on rate of development, behaviour, condition, and eventually dietary and nutritional studies.

(4) To determine the dietary needs and tolerance of man and domestic animals for several of the known essential or toxic elements.

(5) To classify geographical regions in the United

States with respect to the adequacy of supplies of different mineral elements through correlated studies of the composition of soils, crops and animals.

(6) To determine methods of adjusting the mineral composition of plants used for animal or human food in various areas of the United States, by the addition of fertilizers carrying the desired elements or by spraying or dusting the plants, or by other means.

(7) To study the efficacy of supplementing

mineral-deficient diets of man or animals by the direct addition of minerals and growth substances to the ration.

As the work of this laboratory has a nation-wide significance and application, co-operation will be arranged with those State experiment stations, bureaux of the Department of Agriculture, and other research agencies which already have special facilities and staff members especially interested in one or other of the many aspects of this research.

SCIENCE AND ART AT THE ROYAL ACADEMY

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THE canons of art differ greatly in detail from those of science, but since intellectual honesty is the basis of both, there is no fundamental distinction between them. To make an orderly statement of accurately observed facts and from those facts to draw logical conclusions is the very essence of science; but the best art is also logical and orderly, as well as being an accurate interpretation of the impression made by the outside world upon the mind of the artist. Observe the words "interpretation" and "impression"; they are important because they lie at the very root of the matter; whereas science is, or should be, strictly objective, art is intensely subjective. For the rest, the differences are mainly those of design, technique, and of the medium of expression. Is it always recognized that there is as much skill in design shown by the well-written and well-balanced scientific paper as there is in a first-class painting, and that when J. M. W. Turner removed a castle bodily from one bank of the river to the other, because in this way he improved the design on his canvas, he was doing no more and no less than the man of science who puts one section of his paper in front of another so as to improve the balance of the whole? In so far as the man of science recognizes these differences and leaves his prejudices, which are many, outside, so his bewilderment will decrease and his interest and enjoyment increase. In this year's Exhibition at the Royal Academy much is provided to enjoy, and very little to bewilder.

The botanist is always well catered for; this time he is more fortunate than usual. Apart from the landscapes there is a very large number of flower pieces, which range from W. Rankin's big pictures in the Dutch style, highly finished and accurately drawn, to sketchy impressions incapable of recognition without recourse to the catalogue. "The Change", by Heda Armour, is presumably

allegorical and so should be immune from the scientific Philistine, who contents himself with wondering when winter aconite, snowdrops, flag irises and the cuckoo all came together in the same place at the same time. The botanist, too, is this year favoured by the only obvious jest, "The Champion", by J. W. Tucker. This is a monstrous cauliflower to the grower of which homage is being paid by the mayor and corporation with the press and news-reel men in attendance. Mr. Tucker has chosen tempera as his medium and achieved his end, but painting in tempera as practised at the present day does not seem to be suitable for the successful interpretation of flowers, fruit and vegetables. Be the subject what it may, vegetable marrows, carrots, apples, or even the trunks of beech trees, the impression is always of carefully finished plaster models. Incidentally, there is no well-painted fruit this year because of the shortage; memories have played their owners false and the result is lacking in juice and texture.

Pictures for the zoologist are not many. Two of them, "The Jungle", by Shearer Armstrong, and "The Pine Marten", by Billie Waters, are purely zoological, although the monkeys in the first-named have been somewhat stylized so that one is left uncertain as to what species are intended. For the rest, there are a few shells, particularly good in Mr. Dinkel's "Flower Piece with Shells", some scrawny cats incidental to other subjects, at least one impossible fish, and various kinds of domestic animals of greater or less merit. Among the water-colours, "Flowing Tide" and "Lapwings in Spring", both by C. F. Tunnicliffe, attract attention, but it is in the Sculpture Rooms that zoological subjects are mainly to be found. The best of these are more or less conventional, as, for example, "Yearling", by Raoh Schorr—a bronze statuette of a fawn somewhat after the style of