

for the chickens with comparatively little effort, and it is not necessary to keep chickens confined to houses on account of inclement weather. The cooler summers are not only desirable from the standpoint of the comfort of the birds, but help to maintain high quality in market eggs.

We must look for our supply of fresh winter eggs principally from those sections of the country which have large numbers of specialized egg farms and where climatic and economic conditions are such that large-scale poultry farming is one of the most profitable enterprises in which farmers in the locality may engage.

E. R. JOHNSON.

**ELECTROCULTURE Experiments Not Yet Conclusive** Electrical phenomena are intimately associated with plant development. The nature of the relationship is not yet understood, but the possibility that electricity may be an essential factor in plant development constitutes the underlying reason for electrocultural research.

In some manner as yet unexplained the earth maintains a negative charge in relation to its upper atmosphere, so that in the intervening air an electrical tension of the order of 100 volts per meter is usually present. This lower air contains about 1,000 free ions per cubic centimeter, the greater portion of which carry positive charges and move earthward at the rate of about 1 centimeter a second, giving up their charges on contact. The current density occasioned by such a transfer of electrical charges is of the very low order of  $5 \times 10^{-8}$  amperes per acre.

Growing plants assume the earth potential and readily take these downflowing charges, so that under natural growth conditions a minute electrical current flows through them. The intensity of this current may vary greatly, particularly during storms, when the air locally may become negative and reverse the direction of current flow.

The earth itself, on the other hand, is traversed by minute electrical currents of varying intensity and direction. These currents are quite possibly adjustments to the unequal absorption of air charges occasioned by differences in soil conductivity, in which case they might be classed as secondary currents. It was at one time thought that soil-conducted currents might influence plant growth, but the experimental results have not been promising and this method has been discontinued for the most part.

#### Evidence is Negative

The majority of electrocultural experiments have sought to relate increased growth with the passage of an electric current through air and plants from an overhead system of wires discharging at high voltages. Such a set of experiments were conducted by the department (1907 to 1918), but no satisfactory evidence of a favorable influence for the treatment was obtained.<sup>6</sup> The British Ministry of Agriculture and Fisheries has recently been conducting similar ex-

<sup>6</sup> Reported in U. S. Dept. Agr. Bul. 1379, January, 1926.

periments, and while their results as a whole have not given any definite proof of an increased plant development, certain trials indicated appreciable differences between treated and untreated plants. Because of these significant differences obtained in England the department in 1923 again began electrocultural investigations.

In the present series of trials apparatus is employed which permits of the passage of fairly constant and measurable currents of electricity from an overhead network to boxes of plants on insulated platforms below. A control series, similar in every way except for the treatment, is used for a comparison, and the average increases in growth under these conditions are used as measures of plant response to the different environments. This apparatus is shown in Figure 81.

Although significant differences have been obtained in a number of experiments, the variability of the controls has as yet prevented any satisfactory association of these differences with the current.

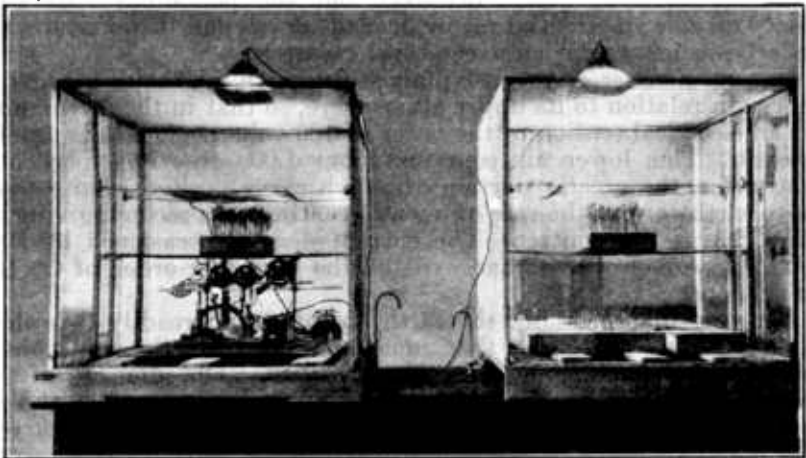


FIG. 81.—Methods used in electrocultural experiments. In the cage on the left a measured current of electricity was passed from the overhead network through the plants on the insulated supports below.

It seems clear that at the present time no practical method of electrical stimulation has been developed.

L. H. FLINT.

## EXHIBITS in Farm Education

The next time you go to your State fair or to one of the big livestock shows, ask the man at the gate where you can find the Government exhibit. He will probably direct you to one of the main buildings. You can easily find the exhibit, because it will have a large sign over it, "United States Department of Agriculture." This is the department's traveling school of agriculture.

This particular school may include such subjects as farm management, livestock raising, better roads, forestry, and home economics. Again, it may be limited to a special course on one subject such as dairying, giving the latest information on methods of feeding, breeding, and management. Whatever the course happens to be