ELECTRO-HORTICULTURE

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BY

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PREFACE

ELECTRICITY is analogous to heat and light, and, like them, has an influence upon the growth of plants. What this is, it is the purpose of the author to inquire into with his readers by presenting to them a summary of what has been accomplished in the comparatively new science of electro-horticulture, and by discussing with them the rationale of the action of electricity upon vegetation.

That he may afford assistance to some who are already at work, and possibly influence others to investigate into this fascinating subject, is his sole motive in offering to the public this monograph.

He has had in view the popular rather than the scientific aspect of the subject, and hence has limited himself to what he felt would most appeal to the average reader.

G. S. H.

PASADENA, CAL., October 1, 1898.

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CHAPTER I

THE DAWN OF ELECTRO-HORTICULTURE. THE APPLICATION OF ELECTRICITY TO THE STALKS OF PLANTS

THE use of electricity in horticulture, while seemingly of recent years, had its small beginning long before the invention of the dynamo, and even antedated several years Franklin's important discovery, in 1752, by which he startled the scientific world with the announcement that he had drawn the "electric fluid" from the clouds by means of a kite, and had proved it to be identical with the electricity of the Leyden jar. As early as 1746, the very year which saw the invention of the famous Leyden jar, Von Maimbray, of Edinburgh, began to study the effects of electricity upon plant life, his first experiment being with two young myrtle trees. He simply passed the current down through them to the soil, and found that it stimulated their growth. Soon experimenters upon the continent were at work along the same line, and their results

were such that they readily agreed with him that electricity exerted a favorable influence upon vegetation. They, like Von Maimbray, passed the electricity, developed mainly by friction, through the stalks of plants to the soil. The machines they used to develop the current were so crude, and their experiments conducted upon such a small scale, that but little advance was made upon the initial experiments, and the interest accordingly waned.

In 1783, Abbot Bertholon became interested in the subject, and his investigations soon convinced him that electricity was decidedly useful in the maturing of plants. His enthusiasm reached a high pitch, and he gave vent to it in a book, *Concerning Electricity in Plants*. He devoted the larger part of it to reporting the results of his experiments, and the remainder to the description of the appliances used in furnishing electricity to the plants.

We shall briefly describe two of these devices. One consisted of an insulated rod, supported vertically, holding up some points in the air and terminating in other points directly over the plant; his intention being to draw down some of the electricity in the atmosphere and pass it through the plant into the ground. The other was more ingenious and complicated, and furnished electricity on a much larger scale. A barrel of water was placed on a cart; beside it stood the operator on an insulated stool. His body was connected by means of an insulated wire with the positive pole of a frictional-electric machine in action. As he dipped

water out of the barrel by means of a large sprinkling-can it became charged with electricity from the machine. By sprinkling it upon the plants while the cart was being driven among them, the current was delivered to them by the water, and passed through them to the soil.

These currents of high electromotive force (pressure), generated by the frictional-electric machines used by Bertholon, could readily pass through the water[1] to the plants, and through them to the ground.

While Bertholon was observing the effects of devices which gave a much larger supply of electricity to plants than they could get from the atmosphere, Gardini, of Turin, was pursuing an opposite course by watching the results of experiments which entirely removed plants from the influence of atmo-

[1] That water will conduct electricity many persons have learned to their surprise when they have attempted to remove a coin from a bowl of this fluid which has been connected with one of the poles of an induction coil, their bodies having been connected with the other pole. Firemen have also learned that it is not safe to throw a stream of water over live electric wires, because the insulation may have been burned off, or removed in other ways, and a dangerous and perhaps fatal current may escape down the stream of water to their bodies. That fertile genius, Mr. Edison, not long ago startled us by suggesting that we utilize the conducting power of water in modern warfare. He spoke of rendering a fort impregnable by means of such simple machinery as a powerful force-pump to propel streams of water, and a dynamo to furnish deadly currents of electricity to them. But a handful of men would be required to run this machinery and direct the electrified streams of water upon the advancing columns of

spheric electricity. The former claimed that by increasing the supply of electricity he could markedly hasten the maturing of plants, and the latter that by depriving plants of it, he could very materially retard their growth. Gardini's method was to protect plants from the influence of the atmospheric electricity by covering them with cages of wire gauze, and then to compare them with others exposed to the action of the electricity in the atmosphere. The wire gauze which surrounded the plants conducted the atmospheric electricity away from them to the ground, and the result was that the plants drooped; when he removed the wire cages they revived again. He gave his conclusions as follows:

" 1. Atmospheric electricity exerts considerable influence upon the production of vegetable matter. All things equal, plants will develop better every-

the enemy, mowing them down instantly. If it pleased these dispensers of death within the fort, they could, by reducing the strength of the current, merely temporarily paralyze their foemen, and then go out and capture them; or, if they were diabolical enough to crave some sport at the expense of their helpless victims, they, by still further reducing the strength of the current, could cause them to throw away their weapons and engage in a dance, which, while amusing to the merciless men within the fort, would be anything but pleasurable to the writhing humanity at the other end of the streams of electrified water. Of course, the enemy might come clad in rubber suits, or otherwise insulated; and then it would be a question of strength of current on the one hand, and perfection of insulation on the other. It is hardly likely that we shall have a practical test of this matter; it belongs more to the realms of electric fancy.