

**IRRIGATION FOR THE
FARM, GARDEN,
AND ORCHARD**

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Irrigation for the Farm, Garden, and Orchard by Henry Stewart

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HENRY STEWART

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AND ORCHARD**

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FARM, GARDEN, AND ORCHARD.



BY

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WITH NUMEROUS ILLUSTRATIONS



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LIST OF WORKS AND PERIODICALS,
WHICH HAVE BEEN CONSULTED OR QUOTED IN THE PREPA-
RATION OF THIS WORK.

- Etudes sur les irrigations de Pyrenees Orientales.* M. Vigan.
Economie Rurale. Boussingault.
Experiences sur l'emploi des eaux dans les irrigations. Hervé Mangon.
Italian Irrigation. M. Baird Smith.
Irrigation in Southern Europe. C. C. Scott Moncrieff.
Des Irrigations du Piemont, etc. A. Vignotti.
Manual of Hydrology. N. Beardmore.
Etude sur le service Hydraulique. De Passy.
Irrigations du midi de l'Espagne. M. Aymard.
Spanish Irrigation. C. R. Markham.
La Science des Fontaines. Dumas.
Hydrologie Agricole. De Buffon.
Traité d'hydrauliques Agricoles. Duponchel.
Outlines of Modern Farming. R. Scott Burns.
Hydraulic Engineering. C. R. Burnell.
Hydraulic Tubes. John Neville.
Drainage, Irrigations, etc. M. Barrol.
Manuel de l'Irrigateur. M. Villeroy.
Irrigations et assainissement des terres. Pareto.
Theoriques et Pratiques sur les irrigations. De Cossigny.
Pratique des Irrigations en France et en Algerié. F. Vidalin.
Culture des plantes Industrielles. G. Heuzé.
Reclamation and Improvement of Agricultural Land. D. Stevenson.
Journal d'Agriculture pratique. Paris.
Reports of the Department of Agriculture. Washington.
Pacific Rural Press. San Francisco.
American Agriculturist. New York.

PREFACE TO THE SECOND EDITION.

When the first edition of this work was issued, the practice of irrigation in America was a new thing, so far as its application to our modern system of agriculture was concerned. Now there are, all through the arid parts of the country, vast irrigating canals, which water many millions of acres, and support a great number of industrious farmers and supply food to thousands of hardy miners, who would otherwise find it impossible to carry on their adventurous but profitable industry. No other country in the world offers such vast opportunities for enterprise in reclaiming arid wastes by means of irrigation, as the United States, and millions of farmers may yet find homes where now all is desolation and solitude, as soon as the aid of capital is invoked to perform the necessary preliminary work.

In considering this grand future, and the possibilities in irrigation which remain to be accomplished, we should not lose sight of the great number of smaller enterprises, that can be carried out on farms which have a supply of water that may be used for the irrigation of meadows and fields. Grass is the grand farm crop. It supports all our live stock, and is the very basis upon which our agricultural prosperity is built up. Clearly, grass is the one thing of which a farmer can never have too much. It is quite as clear that no farmer has enough of it. Yet, by means of irrigation, the yield of this indispensable and invaluable crop might be enlarged many fold. Market gardeners suffer every year from dry weather, which ruins their most valuable crops; while water in abundance, can be procured under the surface at a small

expense, and stored in reservoirs for use when it is needed. Fruit growers are equally interested in irrigation, and in the active competition now existing, and which must always exist in the future, those who will secure their crops by means of cheap but effective irrigating works, will gain a substantial advantage over their competitors, and place themselves in a position of security and independence of the seasons.

The profits which are derived from work and enterprise, depend, not so much upon the extent of these, as upon the effectiveness of the methods employed to make them productive. Five acres, or ten, well cultivated, and supplied with abundant water, will yield, in the course of ten years, as much profit as fifty, or a hundred acres, equally well cultivated, but without any provision for the necessary moisture. Many years of observation, and renewed experiences, during the past eight years, have shown that at least one year in three, there is a deficiency of water for the production of full crops, and the crops of the greatest value suffer the most in such seasons. It is scarcely necessary to do more than to call attention to these facts, leaving to the good sense and the enterprise of American farmers, the adoption of the requisite methods of evading from drouth losses, and the securing of a more satisfactory remuneration for their labor, by the use of the surplus water on their farms, both flowing upon the surface or below it, in such ways as are pointed out in the following pages.

HENRY STEWART.

Hackensack, N. J., January 7, 1886.

IRRIGATION

FOR THE FARM, GARDEN AND ORCHARD.

CHAPTER I.

THE NECESSITY FOR IRRIGATION.

The American climate is especially subject to destructive drouths, and scarcely a year passes in which the crops do not partially or wholly fail over extensive districts. That famines do not occur is not that there are no failures of crops sufficiently serious to cause them, but that our social system is so instantly helpful in case of need, that the want and misery that would otherwise certainly occur are averted by immediate and generous relief. The farmer, when rain fails, is helpless, yet there may be abundant water flowing uselessly past his suffering crops. We possess vast districts, the soil of which is of the highest fertility, but which remain barren and desert because the climate is rainless, yet large rivers flow through these arid tracts, and exhaustless subterranean streams pass through the subsoil. Water only is needed to make these tracts highly productive. The proof of this exists in the fact that already several successful efforts have been made to reclaim portions of these dry wastes by the application of a system of irrigation. But it is not only a question whether or not crops can be produced where they are now impossible, or whether or not the effects of