

CHAPTER XIII.

HUMID REGIONS.

EXPERIENCE has shown that irrigation is often advantageous even in localities where the climate is humid. If the rains came at regular intervals, moistening the soil whenever it became dry, there would be no need of the artificial application of water; but, unfortunately, it often happens that the precipitation for a month takes place in one or two large storms, which not only soak, but flood, the ground and, washing away the rich surface soil, may do more injury than good. The eastern half of the United States has been aptly termed the region of uncontrollable humidity, in contradistinction to the arid region, where, through systems of irrigation, the application of water to the soil can be exactly controlled.

Some of the heavier soils retain moisture for long periods, and the irregularities of rainfall do not noticeably affect vegetation, although somewhat retarding its growth and development. On sandy or pervious soils the alternations of wet and dry produce marked changes, and a drought of a few weeks' duration results in decided injury to

the crops. Thus it happens that in many parts of the humid region small irrigating systems have been built for occasional use. The investments in these may be regarded in the light of an insurance against the accidents of weather, which are so injurious to the farmer.

The most common and widespread form of irrigation is the ordinary practice of watering lawns and gardens. In this sense irrigation is habitually employed in every city and town throughout the United States, although not usually recognized under this name. There is no marked difference between the irrigation of suburban grass plots and gardens in the East, and that of large farms in the arid region, other than in size and completeness of the mechanical devices for conveying and distributing the water.

The almost universal practice of watering grass plots and vegetables testifies to the great value of the artificial application of water, even in the Eastern and Southern states, and the same systematic watering of orchards and fields would produce similar benefits. It is simply a question of cost relative to profits. In the arid region, where crops cannot be raised without water, the cost of bringing it to the fields has, by skill and experience, been reduced to the lowest possible amount. In the humid region, where the necessity has been less, invention and enterprise have not been stimulated to the same degree, and, while all the facilities for

irrigation exist, it has not been generally introduced on a large scale.

The practice of irrigation in arid regions has, to a certain extent, unconsciously prejudiced farmers in the humid regions against it, as they viewed it as something consequent upon desert conditions. It is, however, a method for improving the soil comparable to the application of fertilizers. Large expenses are incurred in purchasing enriching material to be added to the soil, and care is taken to save and apply barnyard manure to increase the yield of crops. The same amount of energy and expense devoted to the construction of irrigation works would doubtless yield even larger returns. Comparing irrigation also with drainage, it is noted that no hesitation is felt by the farmers of the humid East in digging ditches to remove surplus water from fertile bottom lands, but the reverse process, of bringing water to lands which would be productive if sufficiently moist, is a matter the importance of which has not been fully grasped by the agriculturist.

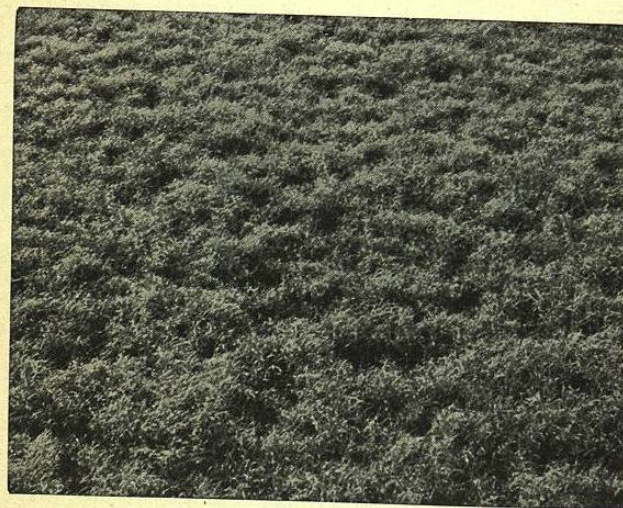
Water, as stated on pages 4 and 180, is the most important plant food, entering in great volume into their tissues, and being the vehicle by which other foods can be obtained in proper quantities. By regulating the supply of this, plant growth can be stimulated even in climates which seem moist, as is illustrated everywhere by watering lawns and kitchen gardens.

The supposedly great expense of bringing water to the fields has deterred many farmers from attempting irrigation. • A little consideration and study, however, will show that farm ditches can often be built in humid lands at far less expense than in the arid region, because the water supply from running streams is larger and more widely distributed. The methods of constructing ditches have been described on pages 102 to 148, and it has been pointed out that irrigation systems on a rather large scale have been built by farmers or associations without employing any special engineering assistance or requiring capital. The work can be done by plough and scraper, aided by pick and shovel; and a man of ordinary skill in farm work, one who can lay out a drain or set an orchard in regular rows, can build an irrigating ditch.

The cost of irrigation in humid regions theoretically should be less than that in the West, owing to more widely distributed sources of water supply. As a rule it has been higher, because most of the devices have been experimental in character, or have been the result of the practice of what might be called fancy farming, where irrigation has been treated as a fad of the owner. The average first cost of bringing water to the land in the West, as ascertained by the 1890 census, was \$8.15 per acre, and the average annual cost of maintenance was \$1.07 per acre. The largest yearly expenditure is in California, as noted on pages 219 and 326. In



A. CLEAN SWEEP OF THE PRAIRIE FIRE.



B. THE CARPET OF GRASS ON THE HIGH PLAINS.

the state of Connecticut 56 farms, with a total area under ditch of 471 acres, were reported as irrigated in 1899. The cost of the ditches, pipes, pumps, reservoirs, and other appliances for obtaining and conveying water to these farms was estimated at \$16,113, — an average of \$34.21 per acre irrigated, or about four times the cost in the arid region.

The value of various small fruits and market garden crops in the vicinity of large cities is estimated per acre as follows: — For strawberries and raspberries, from \$200 to \$400; asparagus, \$100 to \$200; onions, \$150 to \$300, and correspondingly with other vegetables. It is thus very easy for large losses to result from a slight deficiency in moisture. With water applied at the right time a crop may be worth \$400 per acre, while the adjacent field, receiving a trifle less supply, yields only \$100. The difference would repay the cost of one of the most expensive devices for obtaining a water supply.

The best results have often not been obtained because of the fear of getting the ground too wet. In the country of uncontrollable moisture, where rains are apt to occur any day, yet may not fall for weeks, there is always great uncertainty as to the weather, a condition which the farmer in the arid region is not required to meet. He knows that there will be no rain and probably no notable change in temperature for weeks. But in the humid region the farmer, seeing clouds gather, may conclude that, even if an irrigation system is

at hand, it will not be wise to turn water upon the fields. He usually hesitates until too late to secure the best results. If he does apply water, the land may be no sooner thoroughly wet than a heavy rain will occur, almost drowning out the plants. As a rule, however, on open or sandy soil it is difficult to apply too much water, and when the ground is thoroughly saturated after an irrigation the rain will merely flow off the surface or sink into the pervious soil.

Another obstacle to the development of irrigation in the East has been the possible interference with riparian rights. The laws of the humid East, borrowed from England, jealously guard the flowing waters, and as a rule confer extraordinary privileges upon millowners and others who make use of the stream for power. Any diversion of the flowing water for municipal purposes has been usually the subject of long controversy, and attempts to take out ditches for irrigation have often met with opposition on the part of owners of mill rights lower down the stream. It is therefore of great importance to have accurate measurements of the rivers in order to ascertain to what extent the diversion of water may affect water-power below, for it can probably be shown in many cases that the increased seepage in times of low water will compensate largely for the diversion of water, and may be so great as to increase the low-water discharge of late summer.

Owing to the fear of exactions by riparian owners, large irrigation systems have, as a rule, not been attempted in the East, but development has proceeded mainly along the line of using springs or of pumping water by wind power, steam, or gasoline engines. Devices of this kind are being rapidly improved and adapted to local conditions, the cost of procuring water being correspondingly reduced, so that it has been demonstrated that for five or ten acres a small pumping plant can be operated advantageously, the increased productivity of the soil occasionally repaying, even in one season, all of the expense. This, of course, can be true only of the finer grades of fruits, berries, and market garden products. The pumping machines which have proved most successful are those designed for strength and simplicity, so as to require as little attention as possible.

A careful examination of the climatic records of almost any locality in the East shows that in each year the artificial application of water is needed for one crop or another. Sometimes the rains occur at the right times and in proper quantities for the success of orchards, but the fields suffer, or the small fruits and berries may have a diminished yield, while the gardens prosper. One or two years out of five nearly every crop is reduced through lack of moisture at a certain period of growth, so that, where diversified farming is practised and cultivation is intensive, a machine ar-

ranged for providing water can be operated to advantage for a portion of the farm at least. If, however, only a single farm crop is raised, the devices for procuring water are apt to fall into disuse, and by neglect become valueless when called into service after standing idle for two or three years. In short, irrigation is of greatest advantage where a variety of farming operations are practised.

It is not only the character of the crops which must be considered in introducing irrigation in humid climates, but also the quality of the soil. In arid regions all ground requires artificial watering. In humid regions, however, where irrigation is needed more to regulate the time of application than the quantity of water, the character of the soil must be more carefully considered, since some soils retain moisture for long periods. On such soils crops may flourish during a moderate drought, while on others the plants quickly wither unless water is continually applied. There is also a great difference in the quickness with which the soils and the crops together seem to respond to the application of water. With some vegetables, deeply cultivated, there does not seem to be any perceptible difference, while with others there is a most marked change following the systematic practice of irrigation.

The extent of irrigation in humid regions is attested by the numerous orchards and meadows

found by the census enumerators in nearly every state East as well as West. Even in New England there are small farms partly irrigated and partly drained, the distributing system having been in use for generations, and being regarded almost as the natural condition of things. The benefits are shown by the larger yield of hay and of fruit, repaying the trouble and expense of occasionally turning the water upon the ground.

Along the Atlantic coast from eastern New Jersey to Georgia are many areas of sandy soil, excellent for truck farming. Here early vegetables are raised for the New York and other markets. To force these to maturity and insure the largest yield, it has been found necessary to provide water, this being distributed usually through pipes from tanks, and occasionally through open furrows. The Chinese and Italian gardeners in the suburbs of New York and other Eastern cities, following the methods of their brothers on the Pacific Coast, irrigate successfully even in this humid region, and produce results which are envied by their native neighbors.

Irrigation is also practised along the Gulf coast, particularly in Louisiana and Texas, where the cultivation of rice has been found to be exceedingly profitable. Here water is obtained mainly by pumping, and great improvements have been made in machinery for this purpose. Water is also being stored for the rice fields, as it has been found that,

by excessive pumping in times of drought, the salt water from the Gulf has found its way inland up the bayous. To prevent this, extensive reservoirs have been constructed higher up on the rivers, in order that the flow may be reinforced in times of need.

Throughout the central Mississippi Valley, irrigation has been used to a less extent than along the Atlantic border, as the farms are large and the methods of cultivation are not so complete as in localities where the soil is less productive under natural conditions. Here, where nature has done so much, man has attempted little. It is recognized, however, that irrigation can be provided as an insurance against crop loss. During the time of a recent drought, when prayers were asked for rain, one sensible preacher refused, upon the ground that it was not proper to pray for rain when the opportunities for irrigating the fields had been systematically neglected. In other words, he would not invoke supernatural agencies to repair the consequences of man's shiftlessness.

CHAPTER XIV.

CONCLUSION.

In summing up the whole matter of irrigation and its present condition, nothing more concise and direct can be given than a portion of President Roosevelt's first message to Congress, delivered December 3, 1901. In it he made the following statements:—

"In the arid region it is water, not land, which measures production. The western half of the United States would sustain a population greater than that of our whole country to-day if the waters that now run to waste were saved and used for irrigation. The forest and water problems are perhaps the most vital internal questions of the United States.

"The forests are natural reservoirs. By restraining the streams in flood and replenishing them in drought they make possible the use of waters otherwise wasted. They prevent the soil from washing, and so protect the storage reservoirs from filling up with silt. Forest conservation is therefore an essential condition of water conservation.

"The forests alone cannot, however, fully regulate and conserve the waters of the arid region. Great storage works are necessary to equalize the