

this obstacle on such a scale as can concern the agriculturist. Nevertheless, it has long been a favorite speculation with ingenious men, that it is possible, by art, so to change the constitution of plants, as to enable them to endure a climate essentially different from that to which they are naturally accustomed. This has been called acclimatizing, or naturalizing, is supposed to have already resulted in the cultivation of wheat in latitudes originally unsuited to it, and in the acquisition of other useful plants. It has been supposed that the sensibility of plants may be diminished by habit, by a gradation of climate, and by a succession of generations. It is certain that there is a great inequality of constitution among individuals of the same species, some being always more robust than others, and therefore more capable of resisting external influences; it is notorious that the quality of the products of plants is affected by raising them from seeds, wherefore there is much probability that their constitution will vary also under the influence of the same process; and hence continual raising from seeds has been recommended as a means of inuring plants to a climate originally uncongenial to them."

"If this doctrine were supported by sufficient evidence, it would be of the utmost importance to farmers, because it would point out to them a certain means of varying their resources by the introduction of crops now only cultivated in warmer climates; and there would be no reason why rice, or maize, or cotton, or yams, or indigo, or the sweet potatoe itself, should not be introduced into English agriculture."

"It happens, however, that cases in support of this view are not numerous, however plausible the theory may be; and it may be doubted whether in fact any one example of acclimation, in any considerable degree, if at all, can be produced."

The writer then adduces the case of the Canada rice plant, (*Zizania aquatica*), the seeds of which, many years ago, were procured from Canada, and sown in a pond near London, in England. The seeds grew, and produced strong plants; but the seeds from the latter, sown the following spring, produced only weak and slender stems, not half so stout and tall as those of the first generation. Afterwards the plants annually improved and thickened, till they occupied the deeper portions of the water. "This case, (it is argued), "was not one of naturalization, but of deterioration, succeeded by restoration, not improvement." That the Canada rice was not naturalized in England, is sufficiently proved by its having long since disappeared.

"But if no good evidence can be produced of plants having become acclimated by repeated sowings of their seed, the facts on the other side are numerous and conclusive. The Peruvian annual, called Marvel of Peru, the common Indian Cress, the scarlet running Kidney Bean, the Tomato, the Mignonette, an African plant, all natives of hot climates, have been annually raised from seeds ripened in this country, (England), some of them for two hundred generations; yet have in no appreciable degree acquired hardiness, but the earliest frost destroys them now as formerly. Potatoes, long as

they have been cultivated from seed, are in no degree more hardy than those which are now brought to us from Peru and Mexico; indeed, some garden potatoes, imported in 1846 from Lima, and planted in November, stood the severity of the succeeding winter, when the thermometer fell to 3° Fahrenheit, rather better than the English varieties, which had been obtained from repeated seed-sowing during a century."

"While these facts compel us to withhold assent to the doctrine of acclimatizing, by means of seed-sowing for many successive generations, it by no means follows that therefore no other plants can be cultivated advantageously in the fields of this country, than those which now are found there. Although the constitution of plants may not itself be capable of much change, climate may certainly be improved within certain limits by raising the temperature of the soil, and removing superfluous moisture."

Although we have already extended this paper to an inconvenient length, nevertheless, the concluding remarks of the article are so lucid and important to every person that cultivates either a garden or a farm, that we cannot resist the temptation to quote them entire.

"The mere presence of superfluous water acts disadvantageously upon all plants, by causing them to form succulent, spongy shoots, which, in the case of annuals, refuse to flower, and thus remain extremely susceptible of cold. Nothing is more certain than that plants which ripen their shoots late or imperfectly suffer far more from a winter's cold than those in the opposite state; and hence it is that so little injury is sustained by exotic plants after a hot summer, however severe the following winter may become. A dry soil, in which no superfluous water remains, is therefore best adapted for tender plants, on that account alone; but it also acts beneficially because of its higher temperature. It is a great mistake to suppose that plants are affected only by the temperature of the air: they are perhaps more affected by that of the soil in which the roots are placed; and there can be no doubt that crops can bear with less inconvenience a warm soil and a cold air, than a cold soil and warm air. All experiment shows this to be so. And it would even seem that a small difference in the temperature of the soil produces the most essentially different effects upon vegetation, even although it be healthy. Gardeners know that although the common *Nelumbium* will grow in the winter at 65° or 70°, it will not flower and seed unless the temperature of the water rises to 85° or 90°; and yet the same temperature is prejudicial to kindred species. With ordinary field crops, a difference of a few degrees in the temperature of the soil causes a most material difference in the healthiness of vegetation, or the fitness of land for the cultivation of grain species. According to Mr. Ferguson's observations, the mean temperature of the soil near Edinburgh, at a foot below the surface, may be taken to be 52° during the summer months: but if it were to fall to 47°, it is doubtful whether wheat would ripen, well, or at all."