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From the Charleston Mercury. TO THE PLANTERS & FARMERS OF SOUTH CAROLINA.

At the late meeting of the State Agricultural Society, the following Resolution was adopted, viz. "That the President be requested to communicate to the public, before the planting season, such information as he may possess, or which it may be in his power to collect, in relation to the means of modifying the effects of drought on Indian Corn and other provisions."

It is necessary for me to premise, that what I shall say concerning the use of the plough is mainly derivative. From several causes, the planters of the Sea Islands are but slightly acquainted, in practice, with the value of that great agricultural implement. To give the experience of the highest authorities is, therefore, on my part an imperative obligation. It is proper also I should in this place observe that, in consequence of assiduous endeavors to obtain facts from supposed reliable sources, in which I have signally failed, this communication, which would have been made at a much earlier period, has been delayed, but not too late, it is hoped, to be wholly unprofitable.

Satisfactorily to elucidate the matter of the Resolution, would involve a minute examination of many of the topics connected with the science of husbandry. As I am certain, however, it was not designed or intended that my remarks should take so wide a scope, I shall only briefly advert to those principles and their operation upon which some of the most valuable results in husbandry rest.

All the earths have a considerable attraction for the fluid which the atmosphere contains. The very best soils possess this power in the highest degree; hence, it may with certainty be assumed, that the measure of their fertility depends chiefly on their capacity to absorb moisture. In determining their value, however, on the head, two other properties have to be noticed,—the quantity of water which is essential to their saturation, and their power of retaining it. In all these respects, clay and sand occupy antagonistic relations. The former imbibes the aqueous vapors like a sponge and parts with them reluctantly; when dry, it constitutes a compact mass; from the closeness of its texture, the dissolvent action of the air is excluded, by which putrefaction is retarded. The latter is friable and a septic; from the solidity of its particles and their want of coherence, water filters easily. In the adoption of expedients by which to secure these earths a supply of moisture, different processes, in part only, it is advisable to pursue. From their predominance in the State, I shall direct my attention prominently to clayey or ominous soils. What then, are the means which reason and experience assure us are the best calculated to attain the end in view? I answer, deep ploughing; thorough pulverization of the soil; abundance of manure; and the use of salt and retentive atmospherical absorbents.

1. Deep ploughing. The roots of plants should be allowed to extend themselves in every direction. The deeper they penetrate, and the wider their ramifications, the greater will be the absorption of nourishment. The average depth of good soils is about 6 inches. Every inch added increases its value 8 per cent: so that the soil where the vegetable layer is 12 inches thick, is worth half as much again as that in which it is only 6 inches.* It is consequently obvious that whatever, from this cause, may be its enhanced value, if not reached at some time in the progress of cultivation, the remainder is in effect a *caput mortuum*. By deep ploughing the capacity of the whole soil is called forth. While it enables the earth, through the agency of air and water, to inhale atmospherical manure, by diminishing the force of the sun's rays it lessens materially its exhalations. Should the substratum, which perhaps in every instance contains the principles of fertility, be broken still, as a general proposition, the most signal benefits, prospectively, if not immediately, may confidently be expected to ensue from the operation. Deep ploughing ensures the greatest

produce from the smallest given quantity of land. If by the use of one-half of the soil ten bushels of corn per acre be obtained, it is reasonable to infer, all other circumstances being equal, that were the whole in tith, twenty bushels would be harvested: indeed a much larger quantity ought to be the result, for the deeper the soil the greater will be the number of stalks, and the larger and more numerous the ears. The Maize, says Taylor, "is a little tree," and possessing roots correspondent to its size, penetrates a depth almost incredible—9 feet, it is known, have been reached. It follows that, where, from the vigor of the plant or the fertility of the land, the roots meet with no obstruction, the consequences of drought will be sensibly diminished if not entirely prevented. It is believed that the rolling of the leaves of corn is attributable solely to the absence of moisture. This is an error. Scanty manuring or shallow tillage is as often the true cause.

To render deep ploughing* effectual, it should take place in autumn. The expansive power of frost, and the millifying influence of air and rain, and the action of these in breaking the continuity of fibrous matter, are strong reasons in favor of the practice. Whether it should be done once in two or three years only, which, I believe, is the opinion of the most successful farmers of Great Britain, or annually, as is common in parts of our country, is certainly as yet an undetermined point.

2. Pulverization. The soil must not only be made easily accessible to the descent and spread of the roots, but there should be such a disintegration of its parts, as to allow the free transmission of air. However rich in ingredients, these afford no nutriment to vegetation, until subjected to the combined action of heat, air, and moisture—the great agents of decomposition. Unless freely supplied with oxygen, the remains of animals and vegetables do not decay, but they undergo putrefaction.† "The frequent renewal of air by ploughing and the preparation of the soil, change the putrefaction of the organic constituents into a pure process of oxidation; and from the moment at which all the organic matter existing in a soil enters into a state of oxidation or decay, its fertility is enhanced." In a well compounded soil, water is presented to the roots by capillary attraction. As this increases in proportion to the smallness of the particles of earth, the advantage of their complete pulverization is plain. It is equally true, that as food for plants must exist in solution, it is requisite to admit water to the roots by artificially reducing the compactness of the soil by tillage. From frequent working, therefore, the most favorable results may be anticipated; indeed, it has been well observed, that a good stirring of the ground in dry weather is equal to a shower of rain; for however strange it may seem, while it promotes moisture, desiccation is prevented. To aid in the increase and preservation of atmospherical vapor, the ridge system is especially recommended. The breaking up of the old furrows deeply, and making the new ridges on them, by which the two interchange places, provide a quantity of finely divided earth much greater than what is obtained in the ordinary mode. While the coming up of the corn is thereby facilitated, and the thrifty condition of the young plants secured, the depth at which the seeds of grass and weeds are deposited, prevents their germination, except in small numbers; hence labor and time in the culture of the crop are saved. In relation to maize, the author of "Arator" sums up the advantages of high ridges and deep furrows in substance as follows:—"The roots are never cut in one direction, and this great depth of tith is early obtained, by superseding the occasion for deep ploughing in the latter period of its growth, saves them in the other." The preservation of the roots, and their deeper pasture, enable the corn much longer to resist dry weather. Litter thrown in the deep furrow upon which the list is made, is a reservoir of manure, far removed from evaporation; within reach of the roots, which will follow it along the furrow, and calculated to feed the plants when in need of rain. The dead earth brought up by the

plough from the deep furrow is deposited on each side of it, without hurting the crop on the ridge; further, by one deep ploughing, received by the corn, after it is planted, being bestowed upon it whilst it is young, and its roots short, and being run nearly a foot from it, the roots of the corn in this way escape injury, and the effects of drought on the plant being thus lessened, its product is increased.

It would appear from this condensed exposition of his views that, in the opinion of Taylor, one ploughing only, and that a deep and early one the growing crop requires. To clean and pulverize the soil, the harrow, skimmer, or cultivator, alone should be used. Each might advantageously be resorted to in any stage of its growth, but in a parched condition of the earth, their reviscent tendency would then clearly demand it.

With regard to sweet potatoes, the plough may most profitably be employed at any time. When the shoots begin to wither, break up the space between the hills or ridges by running four furrows. The newly turned earth will be found wet in the morning, while before no moisture had been apparent. In a few days the leaves from being brown or yellow will assume a greenish hue, and new shoots may be expected to follow.

3. Manure. The fertility of the soil is the first object to be attained by the farmer. For their dividing properties, all fossil manure are highly esteemed. Deep ploughing and lime, unaided by organic matter, it is well attested, have renovated lands, that in the judgement of the former proprietors, were not worth the labor of cultivation. In reference to the special matter under consideration a judicious admixture of soils is of primary importance. Clay applied to sand assets it in retaining manure, and receiving the vaporized water of the Atmosphere. To allow the fibres of plants to shoot freely, clay, sand and lime, acting mechanically by their mixture, are mutual manures to each other. Burnt clay may beneficially be substituted for sand.

It has already been observed, that pulverized earth has a strong attraction for atmospherical vapor and that this increases in proportion to the minuteness into which the particles are divided; but as the power of the most fertile soils, in this respect, is inferior to that of even the worst ordinary manure, it is evident, that "for the mere purpose of withstanding long-continued dry weather, those plants whose roots have immediate access to organic manures, will be much better enabled to absorb the necessary supplies of atmospherical moisture, than those merely vegetating in the unmanured soil;" hence, whenever fertilizers are employed in anticipation of drought, or to mitigate its evils, in either case, the good to flow from their application to corn, will depend in a high degree upon their abundance, and the materials that compose them. The richer the ingredients and larger the quantity the more decided will be the benefit. Suppose in a propitious season, one acre, judiciously manured, to yield 50 bushels, and 5 acres, of the same natural strength, unassisted by art, 10 bushels per acre; experiments and practice prove that in a drought, the former will produce generally not five-fold, but seven or eight times as much as the latter. I may indeed assert, that the difference in product will be commensurate with the heat and dryness of the weather.

Whether manures should be buried deep or shallow, or lie on the surface, and whether they should be spread in a rotted or unrotted state, are questions which the occasion does not require me to investigate. The tendency of decomposing animal and vegetable matter is to rise in the atmosphere; of fossil manures to sink. As it is known that coarse litter is better adapted to corn than any other crop; if employed when putrefaction has commenced, immediately before the period of committing the seed to the ground, or in the fall, in the shape of long muck, to allow the frosts, rain and wind of winter, to prepare it for the putrefactive process, every portion of the decaying and fermenting fertilizer will be gradually absorbed by the roots and leaves of the plants. All the facts that have come to my knowledge sustain conclusively the principles and reasoning I have advanced. I re-

peat that very rich ground rarely suffers materially for the want of water, especially if it has been properly divided and loosened by artificial means. If, therefore, the withering power of drought should at any time show itself on poor land, let the farmer instantly apply putrescent manure on the surface of the ridge. To the spreading of compost without burying it over the cereals during their vegetation, the English attribute an almost magical influence. They assert that "the plants may almost be seen to renovate and regain their verdure." It is evident, says Thae, that not only actual advantages, but also security against evil is to be derived from the possession of an active manure of this nature, and without any sensible diminution of its value. Though the quantity may be small, yet the beneficial results, first indicated in the change of color in the leaves, will soon appear. In the instance of a planter of this place, whose crop was in a perilous condition from the excessive dryness of the summer of '44, one cart load only to the acre of stable manure, partially decomposed, was instrumental in producing a fine yield, while from the remainder of the field the harvest was very meagre. When the application was made, the corn had begun to tassel; the stalks were small and the leaves yellow and curled. Although the former never increased in size, the latter soon exhibited a healthy green. This favorable indication took place before the first shower of rain, which was slight, and occurred about a fortnight after the trial of the experiment. The secret of my friend's success is traceable to the fact that, as all fertilizers have a strong attraction for atmospherical moisture, he used the one, which of all others, in that respect, guano excepted, possesses the greatest power.

A prominent error in southern husbandry is over-planting. Manuring consequently as a system is not practised. This alone is sufficient to account for the smallness of the aggregate crop for the extent of ground annually in tith. Reformation on this head is therefore loudly demanded. But until this ensue, what is to be done? In what way may the injurious operation of drought be modified, as well by the ignorant as the skilful, the poor and the rich?

4. Salt. In small quantities salt is a septic; in large quantities it resists putrefaction. Though not strictly germane to the subject entrusted to my charge, I hope I shall be excused for here stating the estimation in which this substance is held by many observant agriculturists. It destroys, they maintain, noxious weeds and vermin; gives luxuriance and verdure to grass lands; prevents the scab in (Irish) potatoes; sweetens grass, and hastens the maturity of crops. Wheat or barley following turnips on land that had been previously salted, the ensuing crop, it is well authenticated, escaped the mildew. For a top dressing for grass land, six bushels per acre are recommended; for cleaning the ground preparatory to the putting in of the grain, sixteen bushels, it is said, may be employed upon fallows. An ounce of salt to a gallon of water benefits vegetables; a larger quantity gives a brown color, and is therefore injurious. As it is a stimulant, salt should be mixed with compost, mud, or loamy earth. Its great capacity for inhaling atmospherical moisture renders it peculiarly valuable in dry and hot weather. For Cotton I have used it successfully at the rate of five pecks to the acre. Beyond that, its effects were adverse to the growth and production of the plants. Manure designed for corn, should receive, several weeks before it is put on the land, as much salt as will furnish to every acre not exceeding one and a half bushels. If, however, none of the measures noticed in this communication have been adopted by the farmer, and his crop be suffering from the absence of rain; let him sprinkle on the ridge of each plant or hill as much well pulverized salt as he can conveniently take up with the thumb and two fore-fingers. In a short time, the result, from my own experience and that of some of my co-laborers, will be the same as though the ground had been recently moistened with a moderate shower. How long the benefit will continue I am unprepared to state, for after every experiment

of my own, rain fell from ten to fifteen days. I can only assert that, in the interval, the sated portion of the field was in every respect much superior to the remainder.

5. Organic absorbents. It is not merely necessary that atmospherical gases should be inhaled by the agents which the vigilant care of the farmer may have provided, but to render his labors and knowledge more effectual, they must possess the additional merit of retaining them. The atmosphere is the matrix of manures; these, however, are so subtle and evanescent, that they quickly escape, unless elaborated into permanency by the use of vegetables in a hardened form. The valuable properties of organic matter in a state of putrefaction, if buried in the earth, are absorbed by plants, and "exactly that portion of manure which is lost by the custom of rotting it before it is employed, becomes the parent of a great crop." The most common and yet the most esteemed retentive atmospherical absorbent with which I am acquainted, is the leaves of the pine.* When mixed with farm yard or stable manure, especially if a little salt has been added, it forms a highly fertilizing compound. In attracting and preserving the gases and vapor of the atmosphere, lies, however, its great virtue. In a drought, if applied a few inches thick around each hill of corn, considerable moisture, under the heaps, will be seen in 24 hours, and shortly afterwards, the field, should the farmer's operations have been so extensive, will prove the efficacy of this simple experiment. At the late session of the Legislature, a member of the Senate informed me, that the last summer he employed pine leaves for his growing crop of potatoes with the happiest results. During the drought, he filled the alleys with this material. At the time of harvest, potatoes were found on the earth below the trash. Though unable to speak with precision of his field and that on which no leaves had been placed, yet the product of the one was far greater than that of the other. To determine a question of vegetable reproduction, in 1841, near Brest in France, on a few rods of poor land, untilled and which received no ulterior attention, grains of wheat were strewed, and then covered with wheat straw about an inch thick. In despite of excessive droughts during the spring, prolonged and several times repeated, while all around was drooping and uncertain, the protected wheat sustained no injury. When the plants matured, the straw was found to be "more than 6 feet high, and in the ears were 50, 60, and even 80 grains of wheat of full development." A satisfactory explanation of this experiment, remarks a French writer, is found in straw being a bad conductor of heat and a good conductor of electricity. The roots consequently were maintained in a medium temperature, and the moisture of the earth, furnished by the straw, facilitated the absorption of carbonic acid from the atmosphere. As pine leaves contain a much greater proportion of nutritive juices, they should always be used, if obtainable, in preference to the straw of other trees or any crop.

Having already extended this communication to an unreasonable length, I will merely add, that the true and permanent interest of the agriculturist is to be found in preparing against the vicissitudes of the seasons, and not in weak and uncertain attempts to mitigate their influence. Deep ploughing, loosening effectually the texture of the soil, and a bountiful supply of appropriate aliment, are the surest means for the accomplishment of that purpose. While a parsimonious use of manure is sure to develop slender returns, it promotes slowly but inevitably the deterioration of the land. It is better then, to cultivate a few acres to the plough or labourer, furnished abundantly with enriching materials, than treble the number without nutriment. These truths were practically enforced in the palmy days of Egyptian agriculture. The Roman husbandman was considered blessed who owned 7 acres of ground.

* "Oak leaves," says Thae, "are not easily decomposed, and contain an astringent matter which is highly injurious to vegetation as long as the leaf remains undecomposed."

* Thae.

† About 12 inches.

† Liebig.