and rice also receive attention in the same manner.

Now, there are probably locations where diversified rotative culture is hard to apply, but the long-sighted trucker, who is making a home, must undoubtedly consider the question in every part of the State.

For instance, on the lower East Coast, tomatoes will only thrive profitably two years before a six or eight year rest is demanded for blight, rotations must be studied out that will keep the land fertile and productive. In time it may be necessary to grow the Irish potato only alternate years, though this season the blights have done little damage, and the questions of profit in dipping seed for early blight and spraying for late blight have been inconclusive. Last season the Maine Experiment Station figured that the increase in sound potatoes only paid expense of spraying, which is not very encouraging for the small grower to invest in spraying apparatus and material and take time in the busy season to apply remedies.

In fact, so far as Florida is concerned, moist soils, well drained, ample fertilizers, thorough culture and last, but not least, sound or vigorous seeds of disease-resisting varieties, are the most important matters to consider in vegetable culture. The following notes by Mr. Geo. W. Leonard, of Hastings, and this committee, are of interest regarding his locality:

Cabbages are all right for a money crop if the mercury does not go below 22 degrees. Any temperature below that cooks them.

Celery has not been much of a success this winter; so much wet and cold weather, it couldn't grow.

Cauliflower has done very well in the open this winter in small patches. It is more tender when weather is cold than cabbage, but those who have tried it speak well of it, and think they will do more with it next year.

Cukes are being tried this spring. Vines look well and are setting a good crop. It is too early to say what the yield will be.

In conclusion I will say the Irish potato crop at Federal Point and Hastings was a deficient stand in many cases, owing to wet weather after planting; but the yield and prices, on the whole, are satisfactory.

E. S. HUBBARD.

THE GARDEN.

Mr. President, Ladies and Gentlemen:

Our subject dates back to the advent of man, the Garden of Eden, the most beautiful situation in the whole earth, the paragon of places, from whence our first parents were driven, their lives not being commensurate with so high a privilege. We find that the products of the garden were highly esteemed in very early history. We have Scriptural authority for the fact that Esau traded his birthright for vegetable pottage; also that some of the children of Israel would have turned back from their pilgrimage of great promise in the wilderness that they might again enjoy the cucumbers, melons, leeks and onions of Egyptian bondage. As we come along down through the annals of history we learn of the suspended or hanging gardens of Babylon, the enchanting beauty of which words were too meagre and language too inadequate to express. Thus the authenticity and status of our subject shows forth with the great and important things of creation.

The narrow phases of the modern garden are legion. We picture the garden as being a small enclosed tract of land in close proximity to the dwelling, but here in Florida it has become an expansive field, striving with the farm for supremacy. This brief article will be confined to some of the

things which I am doing or which should be done in Duval county.

In selecting ground, great results are in store for careful and correct judgment. The greater part of the trucker's ground should be low, but susceptible to perfect drainage. Quite a number of vegetables attain their perfection on high ground; therefore both high and low are needed for the production of general varieties.

No one should undertake the cultivation of low ground in Florida until the drainage has been carefully planned and considered in connection with the work. As the sand has the faculty of getting through almost any aperture, with the water, effectual blind drainage has not been realized. I have for several years known of, and am about to have manufactured, a tile which will blind-drain Florida sand perfectly. It is horseshoe shaped and joins under a collar. Through the flat or under side are made two holes, about two-thirds the diameter of the bore of the tile. The water seeks its level up through these holes and flows off rapidly, while the sand is kept down by the force of gravity. The joints of these tiles are to be cemented over the top and down the sides to the bottom, that no water may enter from above the lowest part of the tile. Four boards tightly nailed together, with two-inch augur holes bored through the bottom at short intervals, will do the draining; but where these lengths join each other they must be perfectly and tightly covered over the top and down the sides, that no sand can go through with the water. If possible, the surface or furrow drains should go east and west with the rows, but if such is not possible in a feasible way, a surface drainage must be provided for the immediate relief in heavy downpours of rain. All high grounds sloping abruptly should be worked under the plan of the terrace, for the conservation of the rainfall.

In the latter part of summer or early fall a general preparation of the ground should be commenced by heavily and evenly manuring the whole surface of the ground to be plowed. In this land of perpetual harvest the fertilizing should be very bountiful, for, if your management is good, you will take up the plant food before it can get away from you. Most likely the last crop taken from the ground will have been crab grass hay, for through all the summer and through early fall it interposes itself at every opportunity. Therefore a coulter attachment to your plow will be necessary, which must be kept sharp with the use of a file at short intervals. The plowing should be careful, uniform and thorough, bringing up a thin shaving of subsoil each year. Ground especially which has been under cultivation a few years should be treated this way. The subsoil seems to possess maiden properties which are very effective in germinating seeds and sustaining plant life. Under this process you are also deepening the soil, which should be continued indefinitely, if possible. Any visible grass should be driven down between the furrows with a spade.

A harrow with the teeth slanting backward should be used, which tends to press the grass and roots downward, and rather slides over than pulls up anything that the plow has covered. Ground treated in the above manner, harrowed at once, again one week later, and the third time two weeks from the first, will have practical immunity from cut worms and, if the tillage thereafter is frequent and thorough, the question of their annoyance will be settled.

After the last harrowing, a board as long as the harrow is wide, placed under the center of the harrow, width-wise, sloping back, with the teeth, and its width extending an inch or more below the ends of the

teeth, fastened in any simple way, will make a very effective smoother, quickly preparing the ground for the seed drill.

We are now where the line of procedure should be carefully thought out. A woven wire fence resists natural vegetable growth less than any other, therefore causes less waste of ground. The raising of unseasonable vegetables should not be attempted without an organized preparation. The varieties in general demand should be given consideration.

The seed question is now in order and is, I am sorry to say, the most disturbing element in the trucker's peaceful occupation. Adulterated, old, degenerate and defunct seeds interpose themselves in profusion and are responsible for a vast amount of trouble and often eventual overthrow and failure. Some measures have been taken to prevent this slaughter of the innocents, and I imagined for a short time that matters were to be better, but was disappointed, for the swindle was soon in full thrift and has since so continued. I suggest that truckers raise their own seeds to the extent that it is possible for them to do so, which will in a degree deliver them from this terrible imposition. The seeds one may be obliged to purchase should be bought from some reliable dealer with the understanding that they are to be taken back and money refunded if they do not prove good under reasonable test. Always try your seeds before using. I am practicing the above. In raising seeds one should avoid hybridizing and mixing by keeping seed plants well apart; also use the best specimens to avert degeneracy.

It is no longer a theory that all planting should be done east and west. The returns of several years' practice in comparison with planting otherwise have justified the conclusion. In cold weather the sun shines on the ground between the rows from morning till night, while in the summer time the plants shade and protect each other from the excessive heat. Best of all, rows running east and west afford the finest facilities for intersetting and interplanting, which is yet to become a great factor in Florida gardening, wonderfully increasing production. I do not mean to discourage interplanting when the rows are not to be had that way, for the privilege is very profitable under any circumstances, and especially in close proximity to a city where land is at a premium.

The vegetable kingdom, in the aggregate, is much like the animal kingdom in that it will wander less, or confine its roots to a smaller area, if all its requirements are at hand. Hence the intensive system of production. Deep and lavish enrichment of the soil, with frequent and careful tillage, will afford great impetus to growth, also much earlier maturity.

Plants well grown from choice varieties should commence the garden, and never be absent thereafter. They should be ready for the ground when the third harrowing and smoothing have been finished, and should be set immediately, while the land is in the pink of condition. Have your plans all made how to meet the known emergencies which may beset you. Some are likely to come whose advent you have not taken into account. Also seed should be sown immediately upon the perfect preparation of the soil. They should be thickly sown, as a precautionary measure, also to provide plants for other grounds coming under preparation at a later period. As the chameleon harmonizes its color with a new resting place, so the verdure of winter is transformed into the garlands of spring. In this brief article time would fail me to relate the minutiae and variableness necessary to carry this work through its full course.

Fertilizers are used as desired in every period of growth—quick soluble chemicals

and slow rotted stable manures forked or spaded in between the rows preparatory to setting plants or sowing seeds in either hills or drills.

Some system of protection against the cold waves which are liable to visit us should be formulated and settled upon, with every facility for hasty action. The plant beds are easily disposed of by digging one or more holes in the bed or beds, as required, placing down into them the common household kerosene lamps, to be kept burning all night, under a well joined covering. Plants in the field may be covered with earth drawn upon them with a hoe, pulling the plants over and closing the hearts, if possible. Potatoes, cabbages and some other plants may be covered with a plow, but the furrow must be very light. For cucumbers, squashes and melons greater care is required; therefore the hoe is best. I have practiced this method of covering for several years and find it the best I have ever tried. I have lost plants under boxes, paper and cloth, but none under earth. A very slight earth covering suffices for the plants' safety, and they will receive no injury therefrom as long as the weather continues quite cold. The labor is not lost on the ground, as when the plant is erected through the loose earth, its condition applies on tillage. It is in a degree a species of cultivation.

One should strive hard for the earliest market, which is the cream of the occupation. When a product has been generally offered for a few days it is no longer a thing of much profit.

The insect pest of muskmelons and squashes is largely averted by getting them started early and promoting a rapid growth. Corn also has practical immunity under like circumstances. Now that a rapid growth is shown to be most important, frequent and thorough tillage must be had, shallow at all times, and not waiting for the growth of weeds. The rapid growth can be accomplished in no other way.

The capillary condition of the surface of the soil should be broken by cultivation quite frequently, not only for the preservation of moisture, but also as a remedy for the evil effects of flood and inundation, as soon as practical after their occurrence. Cultivation is a great agency for the normal condition of soil and plant life. It makes plants more vigorous, enabling them to appropriate more from both soil and atmosphere. The drought porosity of the soil, according to my investigation, comes from the gases of decomposition, which is in process all of the time, but much more active in warm weather. Structural changes resulting from heavy rainfalls, vegetable matter deposited in solution, the shifting up and down of the water line and the condition incident to its own process are conducive to gas generation. So one standing over a body of water in warm weather will see occasional bubbles coming to the surface, though the lake may have existed for untold centuries. Now, the broken surface of cultivation arrests the vapor on its way up out of the earth, as do the cooling effects of heavy mulch condense, as well as preserve, the heavy moisture.

The complete equipment and philosophy of gardening avails nothing if the fertilizing is not well planned and thoroughly executed. I would advise everyone engaged in the business to qualify themselves upon the formula for fertilizing such things as they have decided to produce, and make no misconnections, for they are fatal. Defunct and antiquated seeds dismiss you after a little, but the spurious fertilizers will drag you along through the entire season, and at last unrelentingly sacrifice you.

I will not at this time say anything about the double planting that I am practicing,

further than to cite thought in that direction. The work is profitable and interesting and affords its own inspiration, but it must be thoroughly pondered over and unswervingly executed. I am sure it is destined to be a great feature in the future garden of Florida. It is a golden privilege, with that bountiful provision, that emerald gem, crab grass, which has yet failed to awaken the general appreciation of our brother Floridians. I am agriculturally familiar with many of our States, and, in not one, is there a spontaneous, bountiful, three-fold harvest without a seed time, which is the status of crab grass. It is now (the latter part of March) striving for ascendency over the other plants and, if favored with a little timely attention to start in with,—only a minimum of labor,—would give three heavy cuttings of hay worthy of the most fastidious attention. The use of this hay for more than fifteen years has established and fully substantiated the estimate I have given it. When we recount this field so rich and full of prospective enterprises, can we do other than exclaim, "Truly our lines are drawn in pleasant places?"

Intensive gardening is a science of no mean proportions; it is the work of a prince or a peasant. He who clasps hands with the mysterious, unseen, all powerful, is one of nature's noblemen. "The man with the hoe" may be brother to the ox from an industrial point of view, but he is obedient to Divine injunction, and gets his bread by the sweat of his brow. I believe that gardening is today little more than in its infancy. Its followers are like young eagles; rising from the mother's nest, they declare their eagleship. But what do they know of eagling? Have they vied with the very clouds in their flight? Have they pierced the heavens with the velocity of lightning and pounced upon their prey?

A few months since I read an article which stated that if the world's inhabitants continued to increase as they had been and are still increasing, that very shortly after the year 2000 A. D. the earth would be unable to feed its population. It seems to me any attempt to estimate such a striding possibility is superfluous. The real Armageddon of agriculture and horticulture will be fought only when emergency precipitates the battle. Methods will be revolutionized, plants will be known as animals —their requirements, affiliations and aggressions understood. The severest economy will dominate the surface of the whole earth; the mountains will be terraced, the valleys will be plateaued; small streams will be placed in conduits; tidewater will be fenced away from the marshes with self-acting gates to release the ebb and close against the rise. The shallows of the sea will be reclaimed. The arid places of the earth will store their water supply and add to by artificial means for the period of their necessity. The floating gardens of the Orient will come into universal use. The demand has already gone forth to the rock, "Why cumber ye the soil?" What with artificial light, artificial heat, and a manufactured soil and perpetual growth, not only the subterranean places of the earth will be utilized,

But garden upon garden, in layers piled high,
Will extend far up into the dome of the sky.

While this may seem to be an extravagant view, the principle is not only in the realm of possibility, but is being incipiently practiced today.

ABRAM WHEELER.

President—We will now take up the report of the Standing Committe on Fertili-

zer and Irrigation; this committee consists of Messrs. C. M. Conner, R. E. Rose, and Guilford Wakelin.

(The folowing article was made quite interesting by Prof. Conner with the use of steriopticon lantern, showing the different methods of irrigation in Florida.)

REPORT ON IRRIGATION.

Mr. President, Ladies and Gentlemen:

It is hardly necessary to say anything along the lines of irrigation, the reasons for irrigation or anything of that kind, so we are going to show you a number of pictures, illustrating the different processes of irrigation, giving you an idea of the way water is put on the land in the different parts of the country. You know, that the great trouble is to get water elevated. In the West where they can get the water from the mountains, it is easy, but in this part of the country where the water is mostly obtained from springs and sulphur wells it is another proposition. We have here some pictures showing the various methods.

Irrigation in Florida is confined to the trucking and citrus districts principally, and is found necessary owing to the fact that the bulk of our rain during the summer, falls too late for the early vegetables, and sometimes the lack of rain in April and May, injures the citrus crop by stopping growth.

Water is lifted for irrigation by artesian wells, steam engines, wind mills. Water from streams and lakes, which are higher than the fields to be irrigated is also used.

Artesian wells are used more than any other method. The cost is not great and, after the plant is once installed, it costs little to operate. One well will irrigate from five to ten acres, depending upon the flow and the character of the soil.

Pumps run by gasoline engines are extensively used in some sections where the lift is only a few feet. A number of these pumps and engines are found in the neighborhood of Webster. Five horse-power engines are used in most cases. One man at Bushnell had a seven horse-power steam engine, pumping from a lake. The water was carried to the field in a wooden flume which was raised high enough at the lake to let the water run to the field by gravity.

Where a storage tank can be had at a small cost, wind mills are used with some success. Tanks of much capacity must be constructed of earth, in order that the expense does not run too high, and since the soil is mostly sand and does not hold water, it is rather difficult to erect an irrigation plant where wind is to be used for lifting the water. When this method is used, wind mills of the ordinary type are used. On the sea coast, where the direction of the wind is constant, that is, from one direction, a type known as the "Jumbo" may be used. One of this type is in operation near Cocoanut Grove.

The taking of water from lakes and streams by gravity must, of necessity, be confined to those localities where the country is undulating and the field situated below the level of the water. While it is true that this method of irrigating is quite limited, there are numerous instances where water could be used and crops made, whereas the water is allowed to run away and the crops to suffer. A number of streams of this character are found on the State Experiment Station grounds. They have been led out of their course around the hillsides, and used to water crops during the dry season.

In distributing the water, sub-irrigation is used more than any other method. When the ground is too wet during the rainy season, and tile drains are used for taking off the water, they may also be used for irri-