We are told that the Engineers in charge of the Mexican central railway reported that in the building of the road, it was noted that with the coming of the construction train, bearing great quantities of steel rails, that the rain fell in advance of the train at unusual times and in unusual quantities. It is therefore inferred that in the construction of railways the electrical conditions of the country are disturbed that have an influence upon precipitation. The cultivation of the soil allows of moisture which falls to be absorbed by the soil, rather than allowing it to run off as is the case in hard and unworked soils, hence a greater amount of moisture is present in the soil, which evaporating, produces a higher percentage of moisture in the air; the food for a storm is heat and moisture, hence the influence of the cultivation of the soil is facilitating the deposit of moisture. The planting of trees serves a two-fold purpose in this connection. The leaf surface of the tree is very great, when the aggregate is considered, hence can be seen the great amount of increased humidity obtained from the moisture which is thrown off by the leaves; secondly, the roots of trees serve as a sponge, when taken in connection with the soil. Surrounding the roots, which serve to absorb and retain moisture and to allow its gradual escape to spores, thus affording a more constant supply to the streams, preventing their drying up and affording a greater amount of moisture to the atmosphere. The various systems of irrigation, distributing moisture to the soil which in turn is absorbed by the vegetation and finally evaporated, furnishes a most satisfactory means of making the air more humid and of making the conditions more favourable for possible rainfall. All of these conditions combined add very greatly to the moisture of the air, hence food for the storm and facilitate the possibility of rain, when without these artificial means rain would be practically impossible. Hence it may be considered that the opening up of the land to tillage, planting of trees, the building of railroads and general covering of many square miles with vegetation that were formerly barren wastes, have a tendency to retain the moisture from the clouds, and this in turn renders the air more humid, so that there is an actual increase in the moisture of the air, beneficial to vegetation.

THE AMERICAN DEWBERRY.

Some months ago we received a small parcel of the dewberry from the Saharanpur Gardens. Some of these seeds we distributed for trial in high as well as medium elevations, but have not heard with what result they were planted. We are, however, pleased to note that Mr. J. W. Ebert, Superintendent of the Dematagoda slaughter-house, has succeeded in raising a healthy plant, his other seedlings, as he believes, having been originally weeded out by his coolies. It will be interesting to watch the progress of this single plant, growing, as it does, in an apparently uncongenial situation as regards elevation and temperature. In the *Mayflower* for June 1893, appears an excellent coloured plate of the dewberry, and a description of the plant, from which we cull the following:—Among the most delicious berries of recent introduction are the dewberries, which are running or climbing varieties of the blackberry. They may be allowed to trail upon the ground, be trained on a trellis, or tied to a stake like a grape vine. When in flower, the tree is usually covered with manes of large, pure white, sweet-scented flowers, which are succeeded by a profusion of delicious fruits which are larger, richer, and more juicy than blackberries. The fruit ripens about two weeks earlier than most varieties of blackberries. It makes a delightful wine for invalids, possessing the same delicious flavour as the berries. The vines are perfectly hard, and do not sucker from the roots, but increase from the tips.

SOIL INOCULATION.

Nobbe and Hiltner have during the last few years carried out some important researches in this subject at Tharandt. The power which different leguminous plants possess of fixing free nitrogen by means of their root-tubercles varies widely in different cases, and is largely dependent on the nature of the soil. The bacteria in the tubercles of different genera all seem to belong to the same species (*Bacterium radicicola*), but are so energetically influenced by the plant in the roots of which they live that they *lose* more or less the power of infecting other leguminous plants, except those closely related to the kind which they inhabit. The practical outcome of this is that when any special leguminous plant is sown in a particular kind of soil, it will only develop tubercles on its roots if (*a*) unmodified root bacteria are present, or (*b*) root bacteria modified by living within closely-allied species. (*a*) will be the case if no leguminous plants have been grown on the land in question, or if they have not been grown for a long time; (*b*) will happen if the same or a very similar crop has recently grown on the land. If, however, the last crop been a leguminous one of very different kind, the new crop will either develop no tubercles or the tubercles will be few and small, this being associated with little or no power of fixing free nitrogen. This will be the case, for example, if clover follows peas. The farmer, therefore, in cultivating leguminous crops must take care that the soil is properly inoculated with earth from a field which has grown the special crop the previous year. The inoculating earth for peas must be taken from pea-fields, clover from clover fields, &c. In an experiment made in peas by Dr. Salfeld, soil from a pea-field distributed at the rate of 17 cwt. per acre, produced a marked effect. This soil is taken from the part where the roots are situated, strewn on the ready prepared field, and harrowed in. To what extent the bacteria from one kind of leguminous plant will infect other kinds needs careful determination; but this much is known that pea bacteria will infect vetches and vetch bacteria peas, while on the other hand pea (and vetch) bacteria have no effect on clover, and *vice versa*. The fact that the root bacteria undergo modification in different plants has not been sufficiently taken into consideration in past researches, and this accounts or some of the discrepancies between the obser-

vations of various trustworthy observers. The importance of these bacteria in the cultivation of leguminous plants cannot be over-estimated, and inoculation of the soil in preparation for such crops will ultimately become a recognised rule of practice, not inferior to that which dictates the application of mineral manure.—*Scottish Farmer.*

TOUS-LES MOIS.

This is a kind of arrowroot which has been experimentally grown at the School of Agriculture. The following particulars regarding the planting are given by Dr. Nicholls in his work on Tropical Agriculture :—

A kind of arrowroot called Tous-les-mois was imported into England from St. Kitts about the year 1836; and, as it was found to be a valuable article of food, it has made a place for itself in the home markets. The imports into England are still mainly from St. Kitts, but the plant producing the starch is now cultivated extensively in Australia. The starch granules of tous-les-mois are very large, and they can be distinguished with the unaided eye; whilst in the case of all other starches, with the exception of that from the potato, the granules can only be detected by means of the microscope.

Tous-les-mois is obtained from the fleshy underground stems, or tubers, or *Canna edulis*, a plant closely allied to the Marantas, and found growing wild in Brazil, Peru, and Trinidad. Other varieties of *Canna* producing tous-les-mois, are natives of Jamaica, Dominica and St. Kitts, but *C. edulis* is the one usually cultivated for the sake of its starch. It is a very hardy plant, and in Peru, where it is called Adeira, it is eaten like potatoes. The flowers are highly coloured; in *Canna edulis* they are bright red, and in other species they are various shades of yellow and orange.

The plant is a very ornamental one, and, for that reason, is cultivated in English hot-houses. The seeds are round, hard and black, and it is said that they have been used by the natives of India as shot, and hence the name "Indian shot," which is sometimes applied to Cannas generally. Tous-les-mois is very soluble in boiling water; and, on this account, and because of the large starch granules composing it, medical-men recommend it as one of the best starchy foods for children and invalids.

The plant is propagated by division of the underground stem, or by seeds which will germinate after being kept for many years. The land is ploughed up and prepared in the usual way, and the sets are planted a few inches under the ground in rows three feet distance each way. The cultivation of the plant is similar in every respect to that of ordinary arrowroot, and the starch is prepared in the same way as the arrowroot starch, which has been fully described in the preceding section of this chapter.

INSECT PESTS.

The appointment of an entomologist for Ceylon would seem likely to be postponed indefinitely, to judge from the coldness with which the Government have received the request for help in the matter. While sympathizing with our Agricultural friends, we trust that the zeal which has characterized every movement that was set on foot by the planting community, will soon effect the desired end in this matter also. We have seen it stated authoritatively that no less than £80,000 were saved in 1891 in the States of North Dakota and Minnesota, on account of operations based on the knowledge of some of the habits of the grass-hopper. We are aware that a good deal of loss is caused by insect attacks both directly on crops, and indirectly by lowering the vitality of trees which produce crops in the form of fruits or leaves; but the exact extent of the loss will probably remain unknown, till we are rid of the insects which cause the ravage.

It is quite a common experience to find some people expect an individual who is acquainted with the principles of entomology or zoology, to be able to suggest remedies after merely reading a description of the general appearance of an insect which is said to attack a particular crop. These people will not see that certain indispensable data are necessary (which involves time and work, and generally an inspection of the crop and its surroundings) before any remedial measures can be recommended.

The *Sugar Journal and Tropical Cultivator* for July last, gives the following list of questions as comprising the most important information which should be collected regarding any insect or grub which threatens to become a plague :—

1. What is the term of life of the insect, which means, how long does it exist as egg, or larva, or grub, as pupa or chrysalis, and as insect proper?

2. At what time as to season and day or night do the insects swarm and pair, and at what time are the eggs laid; when are they hatched; when, in the case of the grubs, are the larvæ changed into pupæ, and when the latter into beetles?

3. At what depth are the eggs laid, and at what depth, in the case of the grubs, does the transformation into pupæ take place?

4. Where are the places chosen for laying the eggs? Are they laid on plants, or in the soil in a dry and rather sunny position, near creeks or scrubs, on the roads intersecting the cane fields, or in some other well-defined localities? Is land with a dense vegetation, as under green manures, or land with certain characteristics avoided by the females? Is the damage by grubs or insects mainly done in close neighborhood to the places where the eggs are laid, or do the animals migrate to the cane fields from certain breeding place?

5. Does the plague continue on the same fields, or are different localities attacked every year, or does it spread from a kind of centre?

6. Do the grubs at different times of the year keep at different depths in the soil, and can they be reached at these depths by the plough, the cultivator, the subsoiler, or by special implements, especially such that work the soil to greater depth than the plough?

7. Are there certain plants for which the larvæ or beetles show great predilection, and others which do not agree with them, or even act as poisons?

8. Have the insects or their larvæ, etc., certain natural enemies, as birds and others? and can the propagation of the latter be favored by protecting them against other animals and firearms or by other means?