

CONCLUSIONS.

The preceding experiments, much abridged as they are here given, show that the toxic principle of the tuba-root kills insects by acting both as a contact and as a stomach poison. It kills some insects easily, and others with difficulty, but it usually acts slowly and seems to kill by motor paralysis.

The above tests were made under strict control at the Agricultural Boards Testing Laboratory of Vienna (Va). They put beyond dispute the efficacy of tuba-root as a plant-insect poison and give it a high place among agricultural insecticides.

E. MATHIEU.

The Angsana Tree.

Yet another avenue of the Angsana tree (*Pterocarpus indicus*) has succumbed to the "disease" that has already deprived this country of some of its finest avenues. It will be recalled by many how these avenues have disappeared one after the other, first the one on the sea front in Malacca, then about 1907 one hundred trees in Penang, followed by epidemics among these trees at Tapah, Kuala Kubu, Kuala Lumpor and Taiping. A short while ago the avenue along the sea front at Singapore was also swept away. At the end of May this year (1919) some trees at the end of an avenue at Tanglin Barracks, Singapore, began to show the well known symptoms. Four months afterwards the "disease" had advanced considerably along the Avenue, but not successively taking toll of every tree for occasionally one was omitted, but so many trees were affected that it was deemed necessary to cut the avenue down. A look-out was kept for fungi but there was no opportunity to make a detailed investigation of the tissues of the trees. The only fungus collected was one of the tropical varieties of *Polyporus* (*Ganoderma*) *lucidus*, sometimes a stipitate form and sometimes more unguiculate. This is interesting as the fungi formerly collected from these trees have been *Polystictus occidentalis*, Fr., *Polystictus floridanus*, Berk., *Schizophyllum commune*, Fr., and *Polystictus hirsutus*, Fr. So far no fungus has actually been observed in the tissue.

On the other hand it is understood that this tree is generally propagated by means of cuttings. Now there are some who hold that the reason of this tree dying off in the manner it does is a question of senile decay and not of disease. The theory put forward is that the age of the individual tree must be counted from the last time its stock was grown from a seed. It is quite likely this may be many generations and correspondingly a considerable number of years. It is also to be presumed that the avenues and groups of trees which die off at the same time, in the same localities, are planted from the same stock of cuttings and would therefore be approximately the same age. In view of this the following article taken from the Gardens Chronicle Vol. LXVI, No. 4111, page 190 is of interest.

"Mr. Benedict's interesting and valuable investigations on, the senile decay and loss of fruitfulness in plants contained material of special interest to fruit growers. Not the least interesting part of the paper is that in which he appeals to the opinion of that remarkable English horticulturist Thomas Andrew Knight, who, upwards of a century ago (1795) was occupied with this same problem of senility of plants. Knight in fact, came, as the result of his experiments with Apples and Pears, to the same conclusion as that reached by Mr. Benedict, and attributed to senility the gradual failure of different varieties of fruit trees. He found in his grafting experiments that the vigour of grafts was influenced by the age of the tree from which they were taken, and with the acumen of genius he appealed in support of his opinion to the common phenomena presented by certain woodland trees. He observes that certain of them, such as the Aspen, send up multitudes of root-suckers, and adds "were a tree capable of affording an internal succession of healthy plants from its roots, I think our woods must have been wholly over-run with those species of trees which propagate in this manner, as these scions from the roots always grow in the first three or four years with much greater rapidity than seedling plants.

"In another paper published in 1810 and entitled "On the Parts of Trees Primarily Impaired by Age." Knight makes the yet more remarkable comment:—"I am.....disposed to attribute the disease and debility of old age in trees to an inability to produce leaves which can efficiently execute their natural office. It is true that the leaves are naturally reproduced and therefore annually new, but there is, I conceive, a very essential difference between the new leaves of an old and of a young variety." This difference after over a hundred years, would seem to have been now demonstrated.

"It may be added that Mr. Benedict has extended his observations on the veining of young and old varieties, to fruits other than the vine and he found in the case of Apples, Pears, Plums and Peaches that increasing age is accompanied by the same concentration of small veins as occurs in the vine. Hence it would seem that it might be possible to ascertain approximately the age of a tree by an examination of one of its this year's leaves!

"Finally reference should be made to the interesting but purely speculative hypotheses of old age in plants which have been advanced. Of these hypotheses that of Metchnikoff deserves mention. It may be described as the "guilty organ" hypothesis, in that he ascribes old age to the failure of one organ of the body: in the human body the large intestine is the sinner; in annual plants Metchnikoff ascribes to the flower-head the guilt of producing toxins (poison) which destroy the vegetable parts.

"Another hypothesis ascribes senility to cell specialisation. On this an unspecialised cell is immortal, but a cell, the moment it becomes a specialist at certain kinds of work puts off immortality and becomes mortal; but against this view is the fact that a

differential plant cell may resume its powers of growth and division becoming once again embryonic and thereby resuming its immortality.

"Whatever be the final verdict on Mr. Benedict's discoveries we cannot but be grateful to him for getting away from words and appealing to facts. Nor will horticulturists be slow to accept the moral that it behoves us to go on producing new varieties by cross breeding, for whether or no all existing varieties are doomed sooner or later to old age, the fact remains that there is still room for improvement among all our cultivated varieties of fruits and plants generally."

It would be interesting to have authentic records of the behaviour of Angsana trees raised from seed.

T. F. CHIPP.

***Echinodia theobromae*, Pat.**

The following notes are in continuation of the article in the "Garden's Bulletin" Vol. II, No. 5, page 144. Further specimens of *Echinodia theobromae*, Pat. as described by Patouillard in the Bulletin de la Société Mycologique de France" Tome XXXIV, 2nd Fasc. have been obtained growing on small branches of a *Quercus* in the Botanic Gardens, Singapore. The smaller specimens agree entirely with the original description of Patouillard. In the larger specimens, which do not exceed 3 mm. in diameter, the older or generally middle portion of the specimens develops a typical polyporaceous tissue. The pores whose length is the same as the height of the plant, constitute the whole of the specimen except the thin crust of hyphae which is directly applied to the support, and the crust covering the outside edges of the specimens from which the stilboid fructifications arise. The transition from stilboid to porus formation is abrupt, the stilboid columns at the transition area quickly becoming the pore walls of the inner pore surface. The pore surface often presents a lenzitoid appearance. The diameter of the pores is small about 0.20 mm. No spores were found within the pores. (Singapore Field No. 5143).

T. F. CHIPP.

Paddy in the Economic Gardens.

Two adjacent fields measuring together 4398 square feet, or say, one tenth of an acre were put under Paddy on the 20th July.

The land selected is almost an ideal one for the purpose, being a flat of light sandy loam overlying a clay subsoil, which, owing to the low configuration of the ground, drains itself very slowly. After grubbing up the roots, which were heaped and burnt, the land was thoroughly broken up and strewn with the ashes. A corner of the field, 12 feet by 12 (= 144 sq. feet)* was, after 3

* Note—In Cochin China the rule generally followed is to allow, for the nursery 2 hundredths of the acreage to be planted,