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PRELIMINARY REPORT ON A CUTTING EXPERIMENT WITH AVOCADO AND MANGO

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Pyke[1] published in the second Annual report on Cacao research in 1932 the results of the vegetative propagation of cacao from softwood cuttings. These results were followed by the work of Bobilioff (2) in 1934 on Hevea, when the cuttings were taken from very young nursery plants or from the lower part of the stem of older seedlings.

Nursery plants showing only their first two leaves were ringed with fine wire, and after three weeks the stem above the wire was swollen. Cut at the rings and planted in a moist shady place the cuttings formed roots in another three weeks. No growth substances were used in this experiment. Baptist[3] used strong Hevea seedlings about two years old and cut the stem into pieces 15 inches long. The lower sections rooted to some extent (the lowest 19%, next 3%, third from base 3% and when growth substance was used the percentages were greater (90%, 28% and 8% respectively). Leafless cuttings taken higher up the stem or from branches never produced any roots, even with growth substances.

Pyke[1] described the principles and technique of the so-called I. C. F. A. propagator, which was designed at the Imperial College of Tropical Agriculture in Trinidad for the rooting of cacao cuttings on a large scale. The main principle in this type of propagator is the reduction of transpiration to balance the limited uptake of water by the cuttings, and one important means to that end is the reduction of sunlight to about 8% of its full value.

The reduction in solar radiation helps to keep the temperature in the bins below 30°C, and in the middle of the day, when air temperature in the tropics rises to 33° or 34°C., a wet cheesecloth on the glass lids, cools the bins by evaporation to about 30°C. The intensity of light in the bins corresponds to that below the trees in a full-grown Hevea plantation, which noticed by Roelofsen and Coolhaas[4].

More light cannot be given without raising the temperature to a point injurious to the cuttings. Intensity of light is therefore a limiting factor in this type of propagator, and while cuttings of shade-tolerant species continue to assimilate in the bins, the method is not so successful for light-demanding trees such as Hevea, mango, avocado or sapodilla.

Describing a new method of rooting cuttings of hevea and other trees, Stahel[5] mentioned that it was necessary to use two of the doubly covered cheesecloth frames to keep the temperature in the bins down to 30°C.

Without any screen the temperature in the glass covered bins rose to 48-53°C. and was lowered by the wet mosquito net to 41-47°C.

Stahel made attempts to compensate the low light intensity by addition of CO_2 to the air in the bins, and one to six liters of CO_2 per bin per day were administered in fractions every two hours through a hole in the front wall of the bin.

The hevea cuttings were tops of strong nursery plants 2-3 m. high, grown under very light shade, and had 22-24 leaves, of which only about 12 were left on at setting.

They remained in fairly good condition for two or three weeks, but after that showed progressive deterioration. Some leaves turned yellow; the others were killed by fungi. When a few plants began to shed their leaves, the experiment was discontinued.

Stahel writes that even those cuttings that looked normal showed no trace of starch in the wood, though freshly cut material was full of it. No difference in this respect could be detected between the cuttings manured with CO_2 and those from other bins. There seems no doubt that under these conditions the light is insufficient for assimilation of carbon dioxide by hevea at least if the cuttings are from trees grown without shade or under light shade. Stahel noticed, therefore, that some method has to be found by which the cuttings can be kept at a considerable higher light intensity than the I. C. F. A. propagator afford and that the only convenient way that suggested itself was to use a continuous spray of water over open bins. This would keep the leaves cool both by contact and by evaporation, would provide a permanently saturated atmosphere, and also allow a continuous supply of CO_2 by free ventilation. The question was whether the cuttings could endure a daily rain of 8 hours for weeks in succession.

All the material was cut towards the end of the long dry season and was thus in a resting condition. The cut ends were washed for about an hour in water to remove the latex and then dipped for a few seconds in a 0.5 mgr/cc alcoholic solution of indol-butyric acid.

After 6-8 weeks, 10 of 19 cuttings had one or several roots. 12 terminal cuttings manured daily with CO_2 (1/2 litre every hour from 8:00 a. m. to 1:00 p. m.) produced a much more abundant callus than the untreated ones, though fewer rooted.

Later trials showed that for cacao less light was desirable than for hevea. When light was reduced by a suitable overhead screen to about 25%, with the spray used from 9:00 a. m. to 5:00 p. m., he found that single-leaf cuttings from a young well-manured tree gave 95% rooting with indol-butyric acid treatment (2 mgr/cc alcoholic solution) and 88% without it. Well rooted single-leaf cuttings hardened easily in half closed bins.

Branch cuttings of sapodilla root only with great difficulty, if at all. But cuttings from vigorous sucker growth gave 40% rooting without growth substance and 90% when treated with a 2 mgr. solution of indol-butyric acid. Watershoots of avocado with similar treatment gave 60% rooting after 12 weeks.

At the University of Miami were started this year experiments with cuttings of avocado and mangos. For avocada soft and ripe wood cuttings from a mixture of one year old seedlings were used, and for mango cuttings the same material from the so-called turpentine, No. 11, and Haden mango was used.

Four plant propagation boxes were made, following the instruction of a paper from Beltsville, March 1946, by V. F. Stoutemeyer and Albert W. Close, "Plant propagation under fluorescent lamps."[6] In two of the four boxes was built bottom heat installation.

Next to these propagation boxes was made a so-called I.C.T.A. propagator with single glass and one in a green house with a possibility of planting the cuttings under double glass.

By covering the glass with newspapers and cheesecloth 75% of the daylight was taken away. In the wooden propagation boxes, as well as in the more or less copied I.C.T.A. propagators, were built pipes with nozzles for continuous spraying.

Graded coconut compost from the City Nurseries in Miami was used as a medium. A. The following cuttings were propagated under single glass:

10 cuttings of avocado from softwood.

10 cuttings of avocado from softwood treated with Hormodin No. 1.

10 cuttings of avocado from ripe wood.

10 cuttings of avocado from ripe wood treated with Hormodin No. 1.

A thin spray was given during full 24 hours.

Under double glass were planted:

10 avocado softwood treated with Hormodin No. 1.

10 avocado ripe wood treated with Hormodin No. 1.

10 Collins mango softwood treated with Hormodin No. 1.

10 Collins mango ripe wood treated with Hormodin No. 1.

A thin spray was given during full 24 hours.

On the 25th of March the frames in the wooden boxes were planted with the following cuttings:

15 mixed cuttings of avocado.

15 mixed cuttings of mango turpentine.

15 mixed cuttings of mango No. 11.

15 mixed cuttings of mango Haden.

Hormodin was used and a thin spray was given during full 24 hours. When the cuttings were taken, the young avocado mango seedlings were brought out of their dormancy period by abundant spraying.

Plants in the tropics or sub-tropics which are in the dormancy period are definitely unsuitable for any form of vegetative propagation.

During my work in Java, one of the great mango nurseries in the East part of the island, with a rainfall of less than four inches in the four driest months of the year, produced yearly over 200,000 mango buddings which were shipped as stump all over the country by parcel post without any loss, and the percentage of buddings that took was over 90%.

It was possible, only, to obtain that result in bringing the nursery under irrigation in the dry season (the so-called winter in Miami).

There is no possibility for successful budding on a commercial scale when the bark cannot be stripped off, and that is only possible when the plants are in full growth or are brought in that condition.

The best growth of the mango develops during the dry season when the trees can be brought out of their dormancy period by irrigation or an abundant water supply is available.

Results: The only results were obtained from ripe wood cuttings after 8 weeks under full 24 hours fluorescent light and a continuous thin spray.

Taking away 75% of the light during the first four weeks has given no results; neither has the bottom heat given any results. With this first trial, there was no difference in rooting capacity between treated and untreated cuttings with Hormodin No. 1.

Most all the ripe wood cuttings, both from avocado and mango, started with callus formation after about four weeks. Roots developed irregularly during the following four weeks with one exception, the Turpentine mango. Haden rooted the best; next, No. 11; and the so-called Turpentine, very slowly. As none of the cuttings of the Collins mango were put under fluorescent light and 75% of the light was taken away by shading the glass cover of the propagation boxes with paper and cheesecloth, none of the cuttings made roots.

Experiments are now under way to find out whether this system of propagation can be used for rubber, tea, coffee.

1. Pyke, E. E.—1932. The vegetative propagation of cacao. 11. Softwood cuttings. Second Annual Report on Cacao Research, 1932, 6pp.
2. Bobilioff, W.—1934. Stekken van Hevea, Archief voor de Rubbercultuur Vol. 18.
3. Baptist, E. D. C.—1939. Plant Hormones. Journ. Rubber Research Inst. Malaya Vol. 9.
4. Roelofsen, P. A. and Coolhaas, C.—1939. Over het stekken van koffie, stimuleering van de wortelvorming en groeistof behandeling by het enten— Archief voor de Rubbercultuur in Nederl. Indie 1939, 66 pp.
5. Stahel, G.—A new method of rooting cuttings of Hevea and other trees. Landbouwproefstation Suriname.
6. Stoutemeyer, V. T. and Close, Albert W.—Plant propagation under fluorescent lamps, Beltsville, Md. (Revised) March 1945.
7. Cheesman, E. E. and Spencer, G. E. L.—1936. The propagation of cuttings in tropical climates. Tropical Agriculture, Vol. XIII, 1936, 5 pp.