Poisoning Experiments with Hevea brasiliensis
I. Preliminary Trials—Destruction of Trees with 2, 4,-D and 2, 4, 5-T

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A brief review is given of experiments on tree poisoning. The results of these early experiments led to the development and large scale use of sodium arsenite and later the normal butyl ester of 2, 4, 5-T as tree poisons.

THE METHOD OF TREE POISONING recommended for use on estates before and immediately after the war consisted of cutting a horizontal frill one to two inches deep, girdling the trunk, and pouring into the frill a solution of sodium arsenite at a concentration of 5 lb of the chemical per gallon of water. This method, which has proved very successful under estate conditions, was evolved as a result of early work on tree poisoning commenced at the R.R.I. and continued in cooperation with the Forest Research Institute, Kepong, from 1936 to 1939. Earlier methods tried, which proved either unreliable or uneconomic, consisted in applying solutions or crystals of a wide range of plant poisons in auger holes, notches or frills made in the tree trunk or in spraying or painting the tree trunk with similar solutions[1].

The frill girdling method has been superseded to some extent by the simpler and cheaper method of ring barking, which consists in removing a ring of bark about eight inches wide and immediately painting the exposed wood surface with a thin paste containing 5 lb of sodium arsenite and 6 oz tapioca starch to a gallon of water[2]. Sodium arsenite, however, is a dangerous poison; its use in Malaya is governed by the Poisons (sodium arsenite) Ordinance 1949 which defines conditions for purchase, storage and use in agricultural operations, with which small estate owners and especially smallholders, cannot usually comply. Experiments have therefore been carried out to discover an effective tree poison which is less dangerous in use than sodium arsenite and which can be used by smallholders or other persons unable to comply with the regulations governing the use of sodium arsenite.

EXPERIMENTAL

Early trials carried out in October 1953 with formulations of 2, 4-dichlorophenoxy acetic acid and 2, 4, 5-trichlorophenoxy acetic acid as tree poisons showed considerable promise. The normal butyl esters of 2, 4-D and 2, 4, 5-T in Diesoline and the water-soluble amine of 2, 4, 5-T in water were applied to the trees in a frill girdle or on a

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* *Experimental work on the use of 2, 4, 5-T in the killing of rubber trees prior to replanting was* initiated by Dr E. D. C. Baptiste in 1953. Subsequent work has been carried out by Mr P. de Jonge, in cooperation with Dr Baptiste until June 1955 when it was taken over by Mr de Jonge. Dr E. D. C. Baptiste became Director of the Rubber Research Institute of Ceylon in January 1956.

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ring barked portion of tree trunk at concentrations of 1%, 5% and 10%. One pint of the solution was introduced into each frill girdle and one quarter pint was applied to the exposed wood surface after ring barking.

The overall results after six months showed about the same incidence of kills, approximately 90% with the normal butyl esters of 2, 4-D and 2, 4, 5-T, and only 50% of kills with the water-soluble amine of 2, 4, 5-T. There was a slight advantage of the frill girdling method of application over that of the ring barking method.

The best results were obtained with the normal butyl ester of 2, 4, 5-T which gave 100% kills when used at concentrations of 5% and 10% in Diesoline, followed by the normal butyl ester of 2, 4-D, which gave 84% kills at a concentration of 5% and 100% kills at a concentration of 10%. The water-soluble amine of 2, 4, 5-T was ineffective when used at a concentration of 1% but gave about 75% kills at concentrations of 5% and 10%.

Preliminary experiments with applications of the normal butyl ester of 2, 4, 5-T to the bark at the base of a small number of trees showed such promising results[3] that a series of experiments were set up on old rubber trees during 1954 in collaboration with the R.R.I. Smallholders' Advisory Service. The normal butyl ester of 2, 4, 5-T was used at concentrations of 5% and 10% in Diesoline in experiment *A* and at a concentration of 2% in experiment *B*. The results of experiment *A*, observed six months after treatment are summarised in Table 1.

TABLE 1. EFFECTS OF THREE METHODS OF APPLICATION OF 2, 4, 5-T

Ring barking at breast height with 10 inches wide ring			Painting of renewing bark on tapping panel		Painting basal portion of tree trunk			
					10 in.	15 in.	10 in.	15 in
Concentration	5%	10%	5%	10%	5%		10%	
% kill	99	100	0	0	100	100	100	100
Average time in months for trees to die	3	2½	—	—	2½	2	2½	1½
Amount used per tree (fl oz)	2	2½	1½	2	5	6	5	6
Average girth (inches) at a height of 50 inches	26	36	27	47	27	27	38	27

The tree poison has been equally effective whether applied to a ring barked portion of the stem or directly on to the bark near the base of the tree. Application to the tapped panel on half the circumference of the trunk has been quite ineffective.

In experiment B only a 2% solution of the normal butyl ester of 2, 4, 5-T in Diesoline has been used. The average girth of the old seedling trees was 30 inches at 50 inches from the ground. Six months after basal application of the solution to a band 15 inches wide by means of a paint brush 88% kills were recorded at an average time of three months from treatment.

In a further experiment carried out on boundary row trees of Field 23 on the Rubber Research Institute Experiment Station the following treatments were applied, using a paint brush, to the bark from ground level up to a height of 15 inches[4].

A 2% solution of n-butyl ester of 2, 4, 5-T in Diesoline

B 5% solution of n-butyl ester of 2, 4, 5-T in Diesoline

C 10% solution of n-butyl ester of 2, 4, 5-T in Diesoline

D 5% solution of n-butyl ester of 2, 4, D in Diesoline

E 5 lb per gallon of sodium arsenite thickened with starch

F 10 lb per gallon of sodium arsenite thickened with starch

The results six months after treatment are summarised in Table 2.

TABLE 2. EFFECTS OF SIX TREE TREATMENTS, SIX MONTHS AFTER APPLICATION

Treatment	Average girth of trees at 15 inches	Percentage of kills	Average time (months) for trees to die
A	59.7 inches	75	6
B	58.3 inches	92	4½
C	63.7 inches	100	4½
D	58.4 inches	78	5
E	55.1 inches	0	—
F	59.1 inches	0	—

The effect of the 2, 4, 5-T treatments was reflected in a short period of greatly increased yield and it appeared to be worth while to investigate the possibility of a slower kill combined with continued tapping on both virgin and renewed bark. It was also observed that bark development in the treated region appeared to be stimulated markedly, the bark becoming soft and spongy with a notable increase in thickness.

SUMMARY

Methods of tree poisoning are briefly reviewed. Experiments are described and it is shown that the normal butyl ester of 2, 4, 5-trichlorophenoxy acetic acid (2, 4, 5-T) in

gas oil (diesel oil) is an effective tree poison when applied in 5% concentration in Diesoline, by spray or by brush, to the bark at the base of rubber trees from ground level up to a height of about fifteen inches.

Most of the treated trees were killed during the first six months after treatment; and the treatment results in greatly increased yields and in a large increase in bark thickness at the site of application.

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