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THE EFFECT OF SPRAYING FUNGICIDES ON THE PRODUCTION OF RUBBER SEEDS

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INTRODUCTION

As it has already been reported and also experienced by the planters and nurserymen, the rubber seed production in some areas of Sri Lanka is very low. This has badly affected the nursery practices and the seed requirement for nurseries in these areas. Therefore, seeds have to be brought from other areas. Rubber seeds being very short lived when compared to most of the other seeds, problems arise in collecting, storing and long distance transporting. Once fallen from the tree they should be placed on germination beds within 2-3 weeks, the most, if not the seeds will not germinate after this period.

Earlier studies done on this have revealed that the seed production remains as good in relatively drier areas of Sri Lanka whereas in some wet regions the seed production is almost zero.

Although no direct cause for this could be found but it is suspected that the differences in climatic conditions to be one of the main causes. Another possibility relating to climatic or weather conditions, is the occurrence of number of diseases which will directly or indirectly affect the seed production. The objective of the present study was to see whether the spraying of fungicides during the flowering and pod formation period has any effect on the seed production and hence to confirm or exclude the disease factor in relation to seed production.

MATERIALS AND METHODS

Twenty clearings were selected for this study from Dartonfield group. Ages of the clearings varied from 9 to 19 years and clones PB 86, RRIC 110, RRIC 121, RRIC 130 and PB 28/59 were included. Three clearings consisting of mixed clones were also used.

A mixture of thiovit, (80% wettable sulphur) and Copper oxichloride at the concentration of 5g each in 1 litre of water was sprayed with an Aspee-Turblow mistblower manufactured by American Spring and Pressing Works Ltd of India. Three clearings at Galewatta, which is a division of Dartonfield estate, were sprayed with this mixture. Thirty five liters of this solution was required to spray the three plots. Spraying was done at approximately 10-12 days intervals as indicated in the diagram 1.

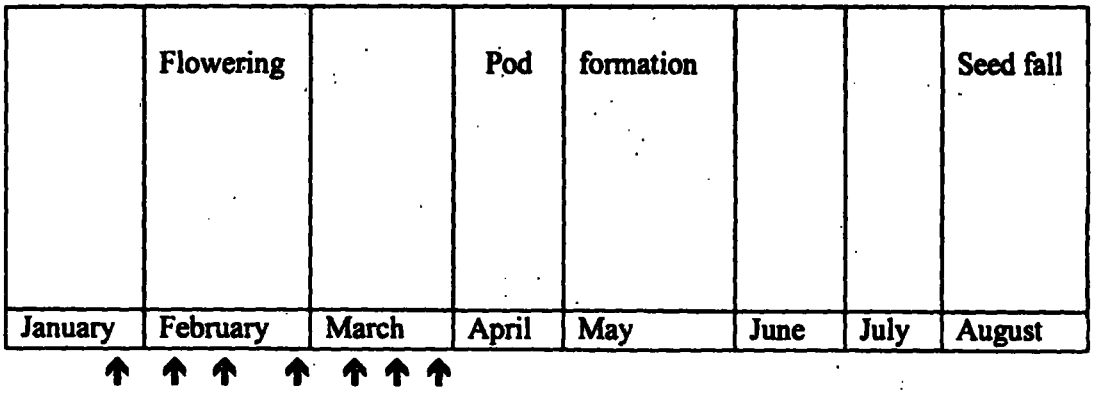

Diagram 1. Spraying schedule of fungicides and seed phenology (↑ - date of spraying)

Quantity of seeds produced was estimated by marking a 50 square feet area in the centre of the each plot and collecting seeds fallen in to this area weekly. Based on this value the production of seeds per hectare was then calculated for each clearing. The results obtained are summarized in Table1.

Table 1. *The seed production of sprayed and control areas*

Clone	Age (years)	Sprayed/ not	Seed Production Number of seeds/Ha. (Quality of seeds)		
			Good	Inferior	Total
PB 86	18	not sprayed	2000	133	2133
PB 86	18		3111	2222	5333
RRIC 121	13	not sprayed	0	0	0
RRIC 121	15		0	0	0
Mixed (100 & 101)	16	not sprayed	12 221	1333	13554
Mixed (100 & 121)	16		8754	1556	10310

Fig.1 shows all the seed production data collected during this study including the results given in Table 1.

As shown in Fig. 1, the positive effect of spraying was seen only with 18 years old PB 86 clearings where the production is more than double in sprayed clearing compared to unsprayed clearings. Seed production of all four RRIC 100 clearings is low, however, 15 years old clearing showed some production. None of the five clearings of RRIC 121 and RRIC 110 clearing or PB 28/59 clearing has shown seed production. Small quantity of seeds have been collected from RRIC 130 clearing. As it can be expected, the seed production of mixed clonal areas is

relatively higher. However, the seed production is little low in the sprayed clearing of mixed clones.

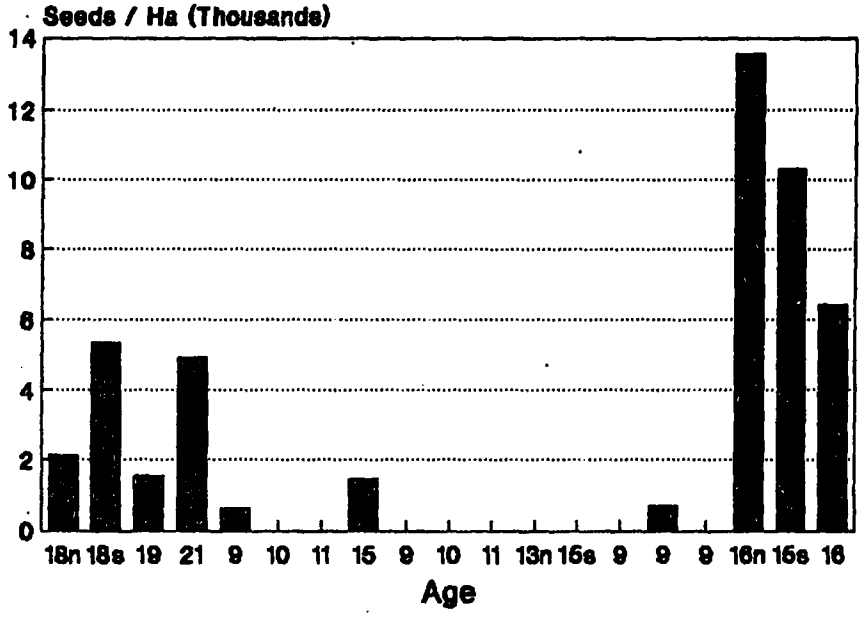

Fig. 1. The age of the clearing, clone and the calculated seed production per hectare for all clearings. Data are given for clones PB 86, PB 28/59, RRIC 100, RRIC 110, RRIC 121, RRIC 130 and three mix clearings. (s = sprayed, n = control)

The clone wise average seed production is also given in Fig. 2. However, it should be noted that for some clones such as RRIC 110 and PB 28/59, the results were collected only from one clearing.

As far as the quality of seeds is concerned about 10-15% of the total produced from all clones are inferior. Results for clearings which were not sprayed are given in fig. 3.

As shown in Fig. 3, RRIC 100 shows the highest number of good quality seeds while mixed clearings show the least.

As far as sprayed and control clearings are concerned, sprayed clearing of PB 86 had 41% inferior quality seeds, while it is only 15% in mixed clearing sprayed with fungicides (Table 1).

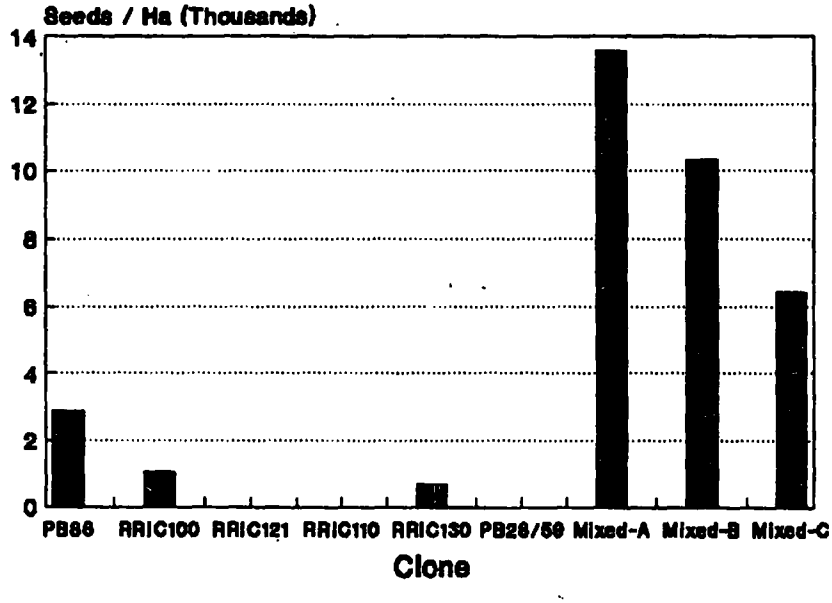

Fig.2. The number of seeds per hectare for clones PB 86, PB 28/59, RRIC 100, RRIC 110, RRIC 121, RRIC 130 and three mix clearings

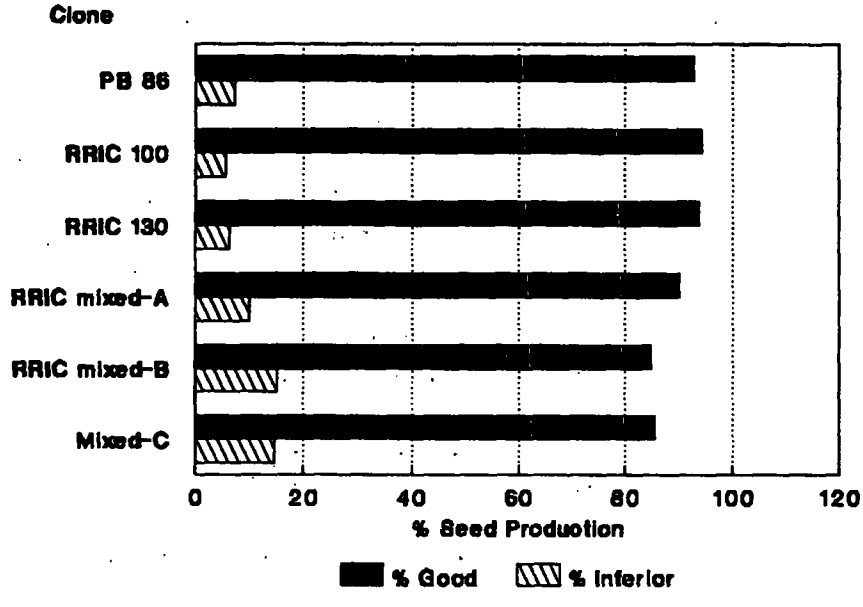

Fig.3. The quality of the seeds of different clones (Data for clearings which were not sprayed have been used).

The spread of the seed fall show some what similar pattern in all the clones compared (Fig.4).

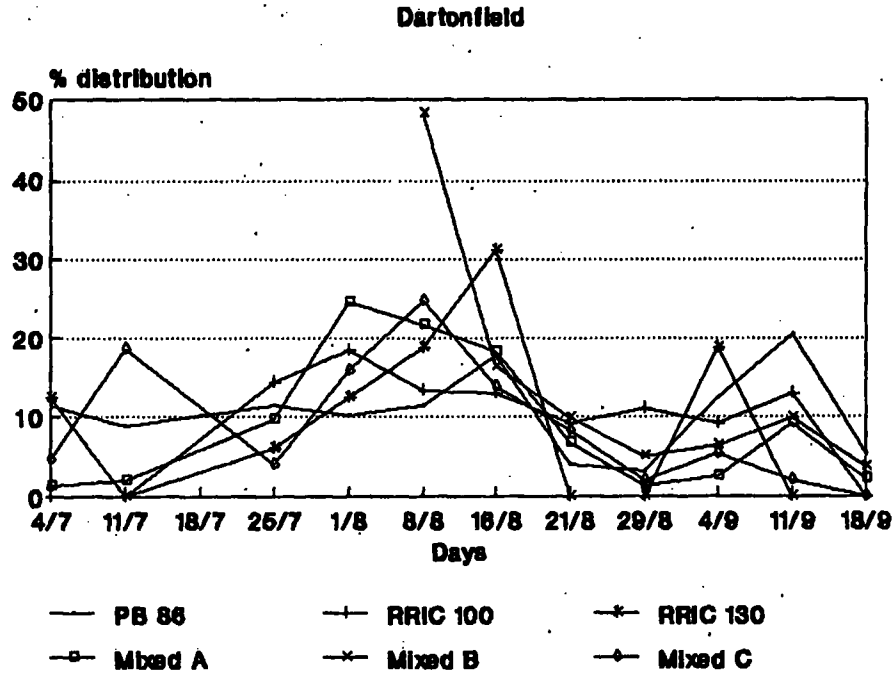

Fig.4. The seed fall pattern for different clones PB 86, PB 28/59, RRIC 100, RRIC 110, RRIC 121, RRIC 130 and three mix clearings.

DISCUSSION

Reports on spraying fungicides to promote seed production are rather remote except for plant breeding experiments. However, the Annual reports of the Pathology Division, Rubber Research Institute of Malaysia for 1966-1969 report flower protection experiments in which sulphur was either dusted from the ground or a wettable powder was sprayed from the air. The results have been interpreted as or little effect of sulphur application in the years when there was little Oidium. It has further been reported that the severity of *Oidium* is related to weather conditions during refoliation and flowering and thus the weather, diseases and flower protection are among the many factors which determine seed fall.

Results obtained in field experiments conducted in Sri Lanka for the control of *Oidium* has revealed that effect of either dusting of sulphur or spraying wettable powder may not give correct indication of the control measures adopted if the attack is mild (Peries et al, 1963, Peries, 1965). More over, a forecast on seed production indicates high yielding clones to be not prolific seed bearers (Peries, 1965).

From the studies done so far, clonal effect was not observed in dry areas where the seed production was generally high in all recommended clones. However, clonal effects, though exist for production of seeds, can be more related to the susceptibility to diseases such as *Oidium* and *Phytopthora* rather than the yield in these clones.

When estimating the number of seeds per hectare Wycherley (1971) has also stated that, the maximum number of seeds per hectare to be about 1,60,000 from a seed garden of prolific clones with continuous flower protection throughout the year. However, 10,000 seeds per hectare has been suggested as a reliable average for moderate seed bearing clones without flower protection treatments.

In the present study, spraying was done only for 2 months starting from late January and ending in late march, since the *Oidium* season in Sri Lanka is generally in February - March. However, reports on effect of spraying fungicides to control seed fall are not available under Sri Lankan conditions. But this has been effective in controlling leaf fall though not used widely under present recommendations as it has been shown that under our conditions the control measures are not warranted as a routine practice due to economic reasons. However, for hand pollination trials, regular spraying of benlate (benomyl) with the use of a hand sprayer seems to be very important (Personal communication).

Also the method of application of chemicals must play a vital roll in this. Though the method of spraying used in the present study has proved to be effective to control leaf fall (Lloyd, 1963 & Peries, 1965) it may not be the ideal for flower protection since flowers are found mainly on the top branches. Aerial, spraying method as it has been practiced in Rubber Research Institute of Malaysia (Annual Reports for 1966-1969) and in India would have been more effective in this regard. In fact, the objective of the present study was to get an idea about this. Even though the spraying was really effective to increase the seed production up to standard levels, it may not be economically viable under our conditions.

The level of pollution caused by spraying chemicals for a long period at canopy height should also be considered, since at the moment in Sri Lanka, an alternative method to find seeds i.e. to get down from areas where the production is not affected and fairly high, is available.

As shown in Table 1, the sprayed PB 86 clearing has produced more than double the quantity of seeds produced in the control clearing but the quality of about 40% of the seeds is inferior. One reason for this could be that spraying was done only for 2 months period during the *Oidium* season. Immature pods are

generally affected by *Phytopthora* causing seeds to fall before maturing, making them non viable. The clone PB 86 being highly susceptible to *Phytopthora* may have undergone this situation as explained. Any how, it should be emphasized that the experiment should be repeated in a much larger areas and in different locations in order to draw a satisfactory conclusion in this regard.

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