IRRDB Symposium on diseases of Hevea,
21–22 Nov 1994, Cochin, India, pp. 59–63. 605

Incidence of abnormal leaf fall disease in clone RRII 105 in traditional rubber growing areas.

K. Jayarathnam, C. Kuruvilla Jacob, Sabu P. Idicula
and Thomson T. Edathil.
RRI India

ABSTRACT

The incidence of abnormal leaf fall disease in the clone RRII 105 was studied over a two year period through a survey covering the traditional rubber growing tracts of India. The results indicated that this clone shows considerable tolerance to the disease. Disease incidence in the southern area, covering the Kanyakumari district and southern districts of Kerala, is very low and judicious omission of spraying is permissible. However, there were individual plantations which showed a high disease incidence in most of the regions.

Introduction

Abnormal leaf fall disease (ALFD) caused by *Phytophthora* spp. is the most important disease of rubber in the traditional rubber growing areas of India consisting of Kerala State, the Kanyakumari district of Tamil Nadu and the S. Kanara district of Karnataka. Even though considerable leaf fall due to this disease is noticed in many clones during the south-west monsoon season from June to August, two clones, RRII 105 and PB 217, were found to show a high degree of field tolerance to this disease. The effect of severe leaf fall will not usually result in the death of trees but they are considerably debilitated leading to a decrease in yield. Secondary problems are also noticed such as an increase in the incidence of other diseases caused by *Phytophthora* spp., eg shoot rot, die-back, leaf rot, black stripe and canker. Additionally, leaf fall allows greater penetration of sunlight which promotes weed growth in rainy months necessitating additional expenditure on weeding. ALFD is managed by the prophylactic application of copper fungicides such as 1% Bordeaux mixture or oil based copper oxychloride in the months of April and May. The cost of different modes of spraying control operations such as high volume spraying of Bordeaux mixture and ultra low volume Micron and Aerial spraying range from Rs 1000 - 3000 per hectare. Such spraying results in not only good leaf retention but also in a reduction in other diseases caused by *Phytophthora* spp. and also Pink Disease. The resistance shown by RRII 105 and PB 217 against ALFD was found to differ in different locations and the percentage leaf fall varied from insignificant to over 80%. In areas with much less leaf fall, medium to severe shoot rot and die-back was noticed and hence doubts were raised whether these two clones need to be protected against ALFD. Field experiments on these clones could be conducted in only one or two locations and hence the results cannot be extended to other areas. RRII 105 is the most popular of these two clones and it is estimated that it is planted over nearly 25% of the total rubber area. As a result, it was decided to conduct a survey on the incidence of ALFD in clone RRII 105 in different regions of the traditional rubber growing tract.

Materials and methods

Survey

The survey was conducted in 1991 and 1992 with the help of more than a hundred Field Officers of the Rubber Production Department of the Rubber Board. A simple proforma with only 8 questions/statements was prepared. The Field Officers were requested to collect details from their field visits to estates during the period August to November. Details of the proforma are furnished in Table 1. In the collecting of data, the main emphasis was on the prevalence of leaf fall in clone RRII 105 and the intensity of leaf fall, as a percentage, by visual estimates from both the Planter and the Field Officer. Details of any prophylactic disease control measure undertaken, the extent of the area under different years of planting and the presence of ALFD susceptible clones in nearby areas were collected. The estates covered by this survey were mostly very small-scale smallholdings below 1ha.

Table 1 ***Proforma used for survey of Abnormal leaf fall.***

SURVEY ON INCIDENCE OF ABNORMAL LEAF FALL IN CLONE RRII 105.

1. Name of Planter :
2. Address :
3. Whether sprayed or not? : Yes/No
4. Whether sprayed regularly or not? : Yes/No
5. If sprayed, mode of spraying? : ✓ mark
   i) Bordeaux mixture : high volume
   ii) Copper oxychloride : micron spraying
   iii) Aerial spraying :
6. Quantity of chemicals used per hectare?
   i) Copper sulphate :
   ii) Copper oxychloride :
   iii) Spray oil :
7. Percentage of leaf fall under each year of planting:

Year of planting	Area in hectare	Percentage leaf fall	Reduction in yield if observed (%)	REMARKS

8. Whether susceptible clones like RRIM 600, PB 86 and Tjir1are present adjacent to RRII 105 area? : Yes/No

Signature of Officer from RP Department, Rubber Board.

Signature of Owner/Representative of the holding.

Threshold level of disease

Since crop loss is the major effect of the disease, a threshold level of leaf fall was determined for crop loss. With clone GT1, Radhakrishna Pillai et al[1] found that a crop less of 22.79% occurred when 50% of the leaves were clipped off and 30.60% occurred when 75% of the leaves were clipped off. In permanent crop loss experiments with clone RRII 105, crop loss was noticed in an irregular manner[2,3]. Crop losses of 6.52% and 23.28% was noticed with a leaf fall of 6 and 15% respectively but in one year there was no crop loss in spite of 14% leaf fall. Accordingly, 25% leaf fall can be safely considered serious enough to cause crop loss and hence the percentage of units was estimated which suffered from 25% leaf fall and above.

The number of units covered in the survey was 1005 in 1991 and 1422 in 1992 covering a total area of 694ha and 1077ha, respectively. The 1991 data was categorised into 15 districts and the 1992 data into 21 regions, the latter being subdivisions of some districts. The 1991 data was analysed manually and the 1992 data using a computer.

Results and discussion

The data on maximum leaf fall noted, the percentage of units with leaf fall above 25% and the percentage of protected units amongst units with leaf fall of 25% and above according to district/region are furnished in Tables 2 and 3 for the years 1991 and 1992 respectively.

Table 2 ***Incidence of Abnormal leaf fall disease in clone RRII 105 in 1991***

Districts	No. of units covered	Maximum leaf fall (%)	Units with leaf fall (%)	% Units with ≥25% leaf fall	Sprayed units (%)
Kanyakumari	21	20	4.75	0	0
Trivandrum	59	25	30.51	8.47	8.47
Quilon	58	60	56.90	12.06	50.00
Pathanamthitta	63	80	76.19	7.94	38.10
Kottayam	227	85	70.84	13.71	50.18
Idukki	20	40	85.00	20.00	40.00
Ernakulam	153	90	62.74	17.64	33.33
Trichur	56	85	96.43	29.62	57.14
Palghat	41	60	87.70	46.34	39.00
Malappuram	55	50	65.46	18.18	38.18
Calicut	42	50	82.50	45.23	23.81
Wynad	8	40	87.50	25.00	75.00
Kannoor	104	80	77.88	25.00	74.04
Kasaragod	38	70	92.11	21.05	63.16
Mangalore	10	95	90.00	70.00	70.00

Table 3 *Incidence of Abnormal leaf fall disease in clone RRII 105 in 1992*

Region	No. of records	Mean leaf fall (%)	Maximum leaf fall (%)	Units with ≥25% leaf fall
Nagercoil	29	0.69	05	0
Trivandrum	120	5.88	50	8
Punalur	82	7.15	30	4
Pathanamthitta	95	7.14	40	3
Changanacherry	37	5.14	30	1
Kottayam	76	9.45	80	5
Palai	100	14.66	75	10
Thodupuzha	31	8.35	35	4
Kanjirappally	81	10.09	50	12
Erattupetta	58	10.38	60	8
Moovattupuzha	74	7.89	50	9
Kothamangalam	58	26.59	75	39
Ernakulam	80	10.50	70	7
Trichur	53	11.60	50	5
Calicut	51	21.27	85	17
Nilambur	95	10.36	50	10
Palakkad	99	18.29	75	7
Thalassery	14	25.71	75	6
Kanhangad	48	16.02	75	7
Thaliparamba	135	23.51	95	57
Mangalore	5	16.67	70	1

The results indicate that ALFD did occur in clone RRII 105 and that the maximum leaf fall noticed in 1991 and 1992 was 95%. The proportion of units and the area of units with leaf fall in 1991 and 1992 was around 75%. The general indication was that there was a tendency for the intensity of ALFD to increase along with the intensity of the south-west monsoon, ie disease intensity increased from the Kanyakumari region towards the S. Kanara region. The maximum percentage of leaf fall recorded in Kanyakumari region was only 20% in 1991 and 5% in 1992 whereas in other regions it varied from 30 - 95%. In 1991, the number of units with 25% leaf fall and above was zero in Kanyakumari and below 10% in Trivandrum and Pathnamthitta Districts and in the rest of the districts 10 - 70%. In 1992, the figure was below 10% in Nagercoil, Trivandrum, Punalur, Pathanamthitta, Changanacherry, Kottayam, Ernakulam and Trichur regions and in the rest of the regions ranged from 12 - 58%.

Amongst the units with 25% leaf fall and above in 1991, only 37.75% units were protected. Although 44.68% of all units were sprayed, only 34.33% had leaf fall above 25%. In 1992, the percentage of units protected was 39.59%. The majority of the area was sprayed

with Micron sprayers and only one unit used aerial spraying. This may be due to the fact that the survey mainly covered smallholdings. There was no leaf fall in 90 units in spite of the presence of highly susceptible clones in the vicinity.

Clone RRII 105 yields 1500 kg/ha on average. The cost of full dose prophylactic spraying can be met by the cost of 50kg of dry rubber, ie 3.33% of 1500kg. Plantations with 25% and above leaf fall must be protected against ALFD as it may cause a crop loss of 3% and above. The survey indicates that plantations in the southern-most region of the traditional rubber belt such as Kanyakumari, Trivandrum and Pathanamthitta districts may avoid spraying with less risk. Individual planters in other regions have to decide on the need for the spraying in their plantation based on their earlier experience of leaf fall intensity.

References

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