

## Research Article



## Occurrence of Bacterial Blight Disease in Rubber Tree (*Hevea brasiliensis*)

V.N Ariharan\*<sup>1</sup>, V.N. Meena Devi<sup>2</sup>, N.K. Parameswaran<sup>1</sup>, P. Nagendra Prasad<sup>1</sup>

<sup>1</sup>Dept of Biomedical Engg, Noorul Islam Centre for Higher Education, Noorul Islam University, Kumaracoil, Thuckalay, Tamilnadu, India.

<sup>2</sup>Dept of Physics, Noorul Islam Centre for Higher Education, Noorul Islam University, Kumaracoil, Thuckalay, Tamilnadu, India.

\*Corresponding author's E-mail: [kabilvn@gmail.com](mailto:kabilvn@gmail.com)

Accepted on: 10-10-2015; Finalized on: 30-11-2015.

### ABSTRACT

Rubber tree is a plantation crop in South India. It is an introduced tree from Brazil. Now India is in the third position among the rubber cultivating country in the World level. Rubber is an important plantation crop in south Tamilnadu and south Kerala. In rubber tree, lot of bacterial and fungal disease were reported. Among the bacterial disease, the blight disease which is caused by *Xanthomonas campestris*. The *Xanthomonas campestris* is a gram negative rod shaped bacteria. The symptom of the disease is appearance of yellow spot in the middle of the leaf and extends to lateral sides. Because of the infection of the bacteria, the colour of the leaves, change in to pale yellowish green, and finally wither off. The disease symptoms and the economic lose are discussed in this communication.

**Keywords:** Rubber tree, blight disease, *Xanthomonas campestris*, *Hevea brasiliensis*.

### INTRODUCTION

**H***evea brasiliensis* is a tree belongs to the family Euphorbiaceae.<sup>1</sup> This is commonly known as Rubber in Tamil, English and Malayalam.<sup>2</sup> Rubber is native to the Amazon region.<sup>3</sup> Today rubber plantations are found in several countries in the tropics from its native habitat in the Amazon Basin to Guatemala, Mexico, Brazil, Venezuela, Ecuador, Colombia, Peru, Bolivia, Nigeria, Liberia, West African continental, Southeast Asia and the Indian sub-continent.<sup>4</sup> Other countries in Asia involved in rubber plantations are China, Vietnam, India, Sri Lanka, Philippines, Myanmar and Cambodia.<sup>5</sup> In India, Kerala and Tamil Nadu together constitute the traditional rubber growing regions.<sup>6</sup> The tree grows up to 40 m tall. The rubber tree begins to produce fruit at 4 years of age. Tapping begins when trees are 5–8 years old, depending on the area, and increases every year until a maximum at about 20 years, then yield sustained for 40–50 years or more.<sup>7</sup> Rubber is produced year round, with great fluctuations month to month. An average pre-war yield for unselected trees was about 300–450 kg latex/ha; about twice that for bud-grafted trees of approved clones and 700–2,000 kg latex/ha for improved plantings.<sup>8,9</sup> The natural rubber is obtained by tapping the trunks of the trees. The latex coagulates with the aid of acetic acid, formic acid, and alum. Cured rubber used for all types of rubber products.<sup>10</sup> Seeds are source of Para rubber seed oil is recommended for manufacture of soap and biodiesel.<sup>11</sup> Although poisonous, seeds can be eaten as a famine food after processing. Boiling removes the poison and releases the oil which can be utilized for illumination.<sup>12</sup> Seeds are sometimes eaten off by the cattle. Kernels (50–60% of the seed) contain 40–50% of semi-drying pale yellow oil which is used in soap making, paints, varnishes, and is effective against houseflies and

lice.<sup>13</sup> The present study is about the primary infection of the bacteria which will easily spread from one tree to another. At the beginning stage of the infection, yellow leaf spot appeared in the leaves is the symptom of the blight disease.

### MATERIALS AND METHODS

#### Collection, Isolation, Purification

The leaves were collected from the affected tree at Noorul Islam university campus Kumaracoil, Kanyakumari District in Tamilnadu. The leaves were washed with distilled water. From the surfaced sterilized leaves, the infected portions were cut into small round piece with the help of well sterilized gel puncher. The leaf pieces were placed on to the standard nutrient agar plate. It is incubate at 37°C for 24 hours. After the incubation many small colonies were appeared on the margin of the cut pieces of the leaves. These colonies were again selected and inoculate into the nutrient broth for subculture. The subcultures were taken and streaked in to a nutrient agar plates for pureculture and incubate at 37°C for 24 hours. Then the bacteria from the pure colony were taken and stained with standard Gram staining which is subjected for microscopic observation.

### RESULTS AND DISCUSSION

The normal leaves and the infected leaves were shown in the figure 1 & 2. The infected leaf portions were cut into small pieces and put in the agar plate where the colonies of bacteria appeared on the margins of the leaf cuttings. [Plate: 1] The subculture streaked in the nutrient agar produce lot of small round pin head size individual colonies in the culture plate. [Plate: 2] Based on the observation of the morphological and staining pattern of the bacteria, the bacteria which cause the yellow spot is



identified as *Xanthomonas campestris*. The shape of the bacteria is rod shaped and individual colony is about pinhead in size.

The bacteria are of gram negative type. There are previous reports that *Xanthomonas campestris* can sustained in rubber latex.<sup>14</sup> Based upon the previous report of occurrence of the bacteria in the rubber latex, the rod shaped morphological characteristics and formation of small round colonies and the gram negative staining character of the bacteria revealed that the causative organism is *Xanthomonas campestris*.

As for as the authors aware that this is the first report about the occurrence of this disease in Tamilnadu and Kerala. It is only a beginning stage of infection of the disease and it occurs less than one percent of the population in the rubber plantation.

In the trees in addition to the primary infection of the bacterial disease secondary infection by fungi was also noticed.



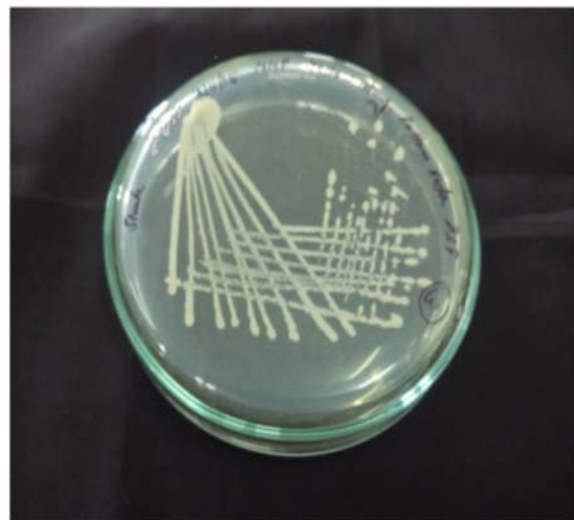
**Figure 1:** Normal leaf



**Figure 2:** Infected leaves



**Plate 1:** Culture plate showing the formation of bacterial colony along the margin of the infected leaf



**Plate 2:** Isolated colonies of *Xanthomonas campestris*

### CONCLUSION

Because of the infection of the bacterial and fungal disease, the yield potential of the rubber trees will be affected. As it is a bacterial borne disease there is a possibility of becoming an epidemic disease in due course.

Further work is needed to identify the fungus which is also causing the leaf spot disease which occurs in this crop. So preventive measures can be taken to control the disease at the earliest possible in order to avoid the economic lose.

**Acknowledgement:** The authors are thankful to the Department of Science and Technology Govt. of India (DST/TSG/AF/2012/01 dated 31 December 2012) for financial assistance to carry out this investigation.

The authors are indebted to the Chancellor and the Management of Noorul Islam University, Kumaracoil for their valuable guidance, constant encouragement and providing basic facilities throughout the study.

**REFERENCES**

1. Gururaja Rao G, Sanjeeva Rao P, Rajagopal R, Devakumar AS, Vijayakumar KR, Sethuraj MR, Influence of soil, plant and meteorological factors on water relations and yield in *Hevea brasiliensis*. *International Journal of Biometeorology*, 34, 1990, 175–180.
2. MeenaDevi V.N, Vijayalakshmi GS, Nagendra prasad P. A hand book of bioenergy crops, *Agrobios (India)*, 2008, 230-234.
3. Allen PW, Fresh germplasm for natural rubber, *Span*, 27, 1984, 7–8.
4. Bahia DB, Pinheira E, Gomes ARS, Valois ACC, Goncalves PS, Melho JRV, Pereira JP, Clones de Seringueira (*Hevea* sp. (HBK) Muell. Arg.), origem e ancestralidade. *Ilheus, Brazil:CEPLAC*, 1985, 428.
5. Bashar Mudhaffar Abdullah, Jumat Salimon, Physicochemical Characteristics of Malaysian Rubber (*Hevea Brasiliensis*) Seed Oil, *European Journal of Scientific Research*, 31, 2009, 437-45.
6. IkwuagwuOE, OnonogbulC, Njoku OU, Production of biodiesel using rubber (*Hevea brasiliensis*) seed oil, *Industrial Crops and Products*, 2000, 1257-62.
7. Chee KH, Holliday P, South American leaf blight of *Hevea* Rubber. n *Malaysian Rubber Research and Development Board, Malaysian Rubber Research and Development Board Monograph No. 13*, 1986, 50.
8. Kim HB, Winnink NA, Effect of surface acid group neutralization on rubber latex films. *Macromolecules*. 27, 1994, 1007-12.
9. AigbodionAI, Okieimen FE, IkhuoriaEU, Bakare IO, ObazeeEO, Rubber seed oil and their alkydresins as binders in water reducible coatings, *J.Applied Polymer Sci*, 89, 2003, 256-9.
10. Enebor EE, Industrial utilization of rubber seed, latex, and wood Rubber research institute of Nigeria, Benin, 1986, 1-8.
11. Ma F, Hanna MA, Biodiesel production: a review, *Bioresource Tech*, 70, 1999, 1-15.
12. VN Meena Devi, P Nagendra Prasad, L Arul Mary Syndia, M Rajakohila, and VN Ariharan, Physico-Chemical Characterization of Rubber Seed Oil (*Hevea* International Journal of Chemical and Analytical Science, 3, 2012, 1402-1404.
13. Bressani R, Elias LG, Ayuso T, Rosal O, Braham KE, Zuniga J, Nutritional Value of protein and oil in rubber seed (*Hevea brasiliensis*), *Turrialba*, 33, 1983, 61-66.
14. Lieberei R, South American Leaf Blight of the Rubber Tree (*Hevea* spp). *New Steps in Plant Domestication using Physiological Features and Molecular Markers, Annals of Botany*, 100, 2007, 1125–1142.

**Source of Support:** Nil, **Conflict of Interest:** None.

