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Survey and indexing of citrus yellow mosaic virus infecting citrus species in rayalaseema region of Andhra Pradesh

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ABSTRACT

Mosaic disease of citrus has been reported from India and Japan. In India, citrus mosaic disease occurring both on fruits as well as leaves on sathgudi sweet orange in Anantapur district of Andhra Pradesh. Earlier several workers also reported that the incidence of the citrus mosaic virus disease ranged from 10-17% in different sweet orange orchards. In the present survey the incidence of citrus mosaic in Anantapur district was 14.1% (sweet orange) and 3.2% (acid lime); in Kadapa district it was 17.05% (sweet orange) and 3.15% (acid lime); and in Chittoor district it was 9.8% (sweet orange) and 10.8% (acid lime) respectively.

Key words: *Citrus yellow mosaic virus, Survey, Index, percentage of incidence, severity, yield of fruits, different orchards*

INTRODUCTION

Citrus is considered to be one of the most remunerative fruit crops of India, having a lasting niche in the international trade and world finance. The most important commercial citrus in India is the mandarin orange followed by the sweet oranges and acid limes. Citrus crop has significant importance in fruit economy of the country and as the second largest industry in India with respect to area and third largest with respect to production, although India ranks sixth among top citrus producing countries of the world. In India, citrus fruits are primarily grown in Andhra Pradesh, Maharashtra, Punjab, Karnataka, Uttaranchal, Bihar, Orissa, Assam and Gujarat. Andhra Pradesh occupies first place in citrus production by producing the 1,805.64 tonnes and 24.19% share of total production in India. So it is very important to survey and index the citrus yellow mosaic virus infecting the citrus species. During the last two decades, a number of virus and virus - like diseases have been recorded from citrus trees in India [14,18,19]. Amongst these diseases "Citrus mosaic" caused by citrus yellow mosaic virus (CYMV), a badna virus is widely distributed in India [13, 2, 3, 5, 6,18,19] which affects some of the important species grown in India. Therefore, studies were planned to survey of citrus orchards for the occurrence and prevalence of mosaic virus in Rayalaseema region of Andhra Pradesh.

The viral infection in plants alters the metabolism and physiology the plant (20, 21) hence it is necessary to conduct survey and indexing of the vial disease to analyze the percentage of infection to control the disease in future.

MATERIALS AND METHODS

Survey of citrus mosaic virus

Commercial citrus orchards or fields in different major villages in Anantapur, Kadapa, Kurnool and Chittoor districts of Andhra Pradesh, indicated below, were surveyed for the occurrence and intensity of citrus mosaic disease.

Anantapur: Reddipalle, Nagireddipalle, Narasampur, Komatikuntla, Balapuram.
 Kadapa : Nandimandalam, Himakuntla, B. Cherlopalli, Vemula.
 Chittoor : Buchinaidukandriga
 Kurnool : Panchalingala

In the present study fifty orchards from various areas of Anantapur, Kadapa, and Kurnool and Chittoor districts were examined. In the survey the mosaic virus suspected sample were collected and brought to laboratory and performed DAC-ELISA [9] and further confirmed by Dot Blot ELISA [7].

RESULTS

Survey of citrus mosaic virus

Commercial citrus fields were surveyed for the occurrence of mosaic disease in selected villages of Anantapur, Kadapa, Kurnool and Chittoor Districts of Andhra Pradesh. In each orchard 100 plants were observed and citrus mosaic infected sweet orange and acid lime plants were recorded on the basis of visual symptoms. Light green and yellow variegation areas were observed in mosaic infected fruits of sweet orange and acid lime (Fig. 1a, 1b). Rangpur lime is not grown commercially in Andhra Pradesh and no data is available on the incidence of mosaic in this cultivar.



Fig. 1a. Sweet orange

Fig.1b. Acid Lime

In the present study fifty orchards from various areas of Anantapur, Kadapa and Chittoor districts were examined. The details of the incidence and severity of the disease on sweet orange and acid lime were presented in the Table. The table shows the percentage of incidence, severity and yield of fruits in different orchards (Table 1 and Fig.3).

Table 1 :Incidence and severity of citrus mosaic in different villages in Anantapur, Kadapa ,Chittoor and Kurnool districts of Andhra Pradesh

SNo	Name of the District	% of total disease incidence	
		Sweet Orange	Acid Lime
1	Anantapur	14.1%	3.2%
2	Chittor	9.8%	10.8%
3	Kadapa	17.05%	3.15%
4	Kurnool	16.04%	4.6%

In the present survey the incidence of citrus mosaic in Anantapur district was 14.1% (sweet orange) and 3.2% (acid lime); in Kadapa district it was 17.05% (sweet orange) and 3.15% (acid lime); in Chittoor district it was 9.8%

(sweet orange) and 10.8% (acid lime) and in Kurnool district was 16.04% (sweet orange) and 4.6% (acid lime) respectively.

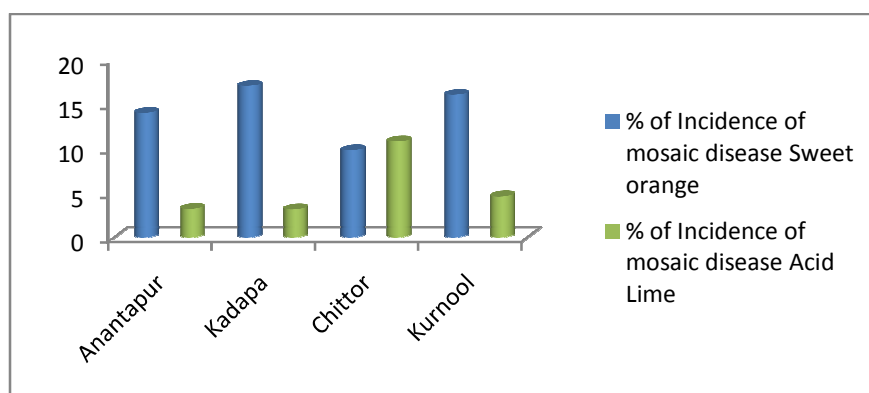


Fig.3. % of Incidence of Mosaic disease

DISCUSSION

Mosaic disease of citrus has been reported from India and Japan [10, 11, 16, 13, 3]. In India, citrus mosaic disease occurring both on fruits as well as leaves, was first reported by Murti and Reddy [13] on sathgudi sweet orange in Anantapur district of Andhra Pradesh. Yellow mosaic disease in citrus is a major limiting factor in achieving disease free root stock of this popular crop in India. It has been reported that a bacilliform dsDNA virus is associated with yellow mosaic disease of citrus. [6,5,14]. But there was no information on mosaic disease of rangpur lime, regarding on its vector, alternative host and biophysical characteristics. Usually plant virologists, while characterising viruses compare unknown virus (es) with the reported virus (es) before reporting them as new virus(es) or strain(s). In the present study, the mosaic virus isolate of rangpur lime under investigation was compared with the data of the reported badnaviruses. In this investigation, an attempt was made to purify and biochemically characterize the virus isolate of rangpur lime causing mosaic disease of citrus and to analyse whether the CYMV infecting rangpur lime is one and the same as the one that infects sweet orange and acid lime or different.

The studies on field surveys indicated that the incidence of mosaic disease on sweet orange was more in Anantapur (17.05%) followed by Cuddapah (9.8%) and Chittoor (3.17) districts; the incidence of mosaic disease on acid lime was found to be more in Anantapur (14.18%) followed by Chittoor (10.8%) and Cuddapah (3.2%) districts and in Kurnool district was 16.04% (sweet orange) and 4.6% (acid lime) respectively. These districts which were in close proximity to the commercial citrus nurseries at Kodur. These commercial nurseries supply large quantities of plant material to the citrus orchardists in and around the State. From the survey data it is understandable as the nursery men collect budwood indiscriminately without any reference to the virus status of the parent trees. The commercial nurseries directly depend on the intensity of the disease in the parental tree. Earlier several workers also reported that the incidence of the citrus mosaic virus disease ranged from 10-17% in different sweet orange orchards. The disease incidence has been reported upto 46% in commercial citrus nurseries at Kodur in Andhra Pradesh [13,17,15,2]. In several citrus growing areas of the world, estimates of distribution of different virus diseases had been made as they had a role in the spread of diseases through bud wood. In Andhra Pradesh citrus bud certification is still in an infant state. From the data it is understandable that most of the bearing trees in areas adjacent to commercial nurseries are used as parent sources, irrespective of their virus affected status. The present incidence of disease in bearing plantations can be a potential source for the effective spread of the disease year after year. The incidence of the mosaic disease ranges from 10 to 70% in citrus orchards and nurseries in Andhra Pradesh, with a yield reduction of fruits upto 77% in ten years old trees and 10% less juice with 1.3% less ascorbic acid and having more acidity [16]. At present, the detection and diagnosis of the badnaviruses and plant viruses in general, is mainly reliant on serologically based procedures and efficient method for quick detection of mosaic in infected plants. ELISA [8] has been routinely used for detection using homologous antiserum. Dot-blot ELISA [7] has also been adopted to allow the detection of CYMV in field infected trees. This method offers a simple, reliable procedure to test a large number of samples under laboratories, whereas inexpensive and simple test is needed.

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