



Original Research Article

Survey on Bacterial Diseases of crop and Non-crops of Cuddapah District, Andhra Pradesh, India

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ABSTRACT

Keywords

Bacterial Diseases, Cuddapah district, Blight, Canker, Rot

A Study on the assessment of some bacterial diseases was done on cropping systems in different mandals of Cuddapah District of in different planting seasons. We made a survey and identified different bacterial diseases based on symptoms and pathogenic nature. Morphological characters of isolates were studied in order to identify the taxonomy of the identified pathogens. Information was collected from the farmers at each crop site. Commercial, vegetable crops recorded significantly high severity of the bacterial diseases with low yield. The present study emphasis is on preliminary Survey of bacterial diseased crops and non crops in the Cuddapah district of Andhra Pradesh, India. Bacterial diseases identified in Cuddapah district are Cankers, leaf spots, wiltings. The present challenge is therefore stipulated to escalate research into improvement of novel, more effectual and sustainable bacterial disease control solutions.

Introduction

Bacteria that associate with plants are diverse in the habitats they occupy, their phylogeny, and their effects on plant and environmental health. The spermosphere, rhizosphere, phyllosphere, vascular tissue and endophytic regions offer distinctive habitats for bacteria (Gwyn A. Beattie, 2006).

Because of the huge diversity in plant pathogenic bacterial invasions in the agricultural systems and high essentiality to survey any part of the country for agricultural production, in this study

surveyed and documented the checklist of some diseases at preliminary level in different mandals of Cuddapah district. Despite the basic importance of studying the epidemiology of bacterial pathogens for their effective control in the field, for many pathogens causing diseases of economic importance there is still a large body of knowledge to acquire (M. Scortichini, 2010). Surveys have suggested that most diseases can be linked to anthropogenic activities (Woolhouse and Gowtage-Sequeria, 2005). Bacteria are microscopic single-celled organisms with short but rapid

life cycles. They need moisture to multiply and grow well. They have both beneficial and pathogenic qualities. They attack the plants and cause the diseases to plants, which further delays the growth, and/or do loss to the yield. Once they attack the plant through contaminations, they grow in the spaces between cells, producing toxins, special proteins or enzymes that damage the plant cells.

These grow by absorbing the nutrients from their surrounding environments i.e., plant so, it will cause damage to the growth of the plants. These bacterial diseases spread by many ways viz., rain, wind, birds and anthropogenic activities with poor cultivation practices. Most plant pathogenic bacteria belong to the following genera: *Erwinia*, *Pectobacterium*, *Pantoea*, *Agrobacterium*, *Pseudomonas*, *Ralstonia*, *Burkholderia*, *Acidovorax*, *Xanthomonas*, *Clavibacter*, *Streptomyces*, *Xylella*, *Spiroplasma*, and *Phytoplasma* (Ellis et al., 2008). These plant pathogenic bacteria cause many serious diseases to the plants throughout the globe (Vidyasekharan, 2002).

Because of the huge diversity in plant pathogenic bacteria and bacterial plant disease, we have surveyed and documented the checklist of some diseases at preliminary level in different mandals of Cuddapah district. Despite, the basic importance of studying the epidemiology of bacterial pathogens for their effective control in the field, for many pathogens causing diseases of economic importance there is still a large body of knowledge to acquire (M. Scortichini, 2010). So, here we have surveyed different crop regions of the Cuddapah district and identified the hosts, diseases, categorized them accordingly. Pathogens were isolated and identified based on morphological characteristics.

Materials and Methods

Study Area

The extensive field survey was undertaken during the survey of plant diseases in 50 revenue mandals of Cuddapah District (GPS coordinates $13^{\circ} 43'$ and $15^{\circ} 14'$ of the northern latitude and $77^{\circ}55'$ and $79^{\circ}29'$ of the eastern longitude). The Geographical area of the District is 15,359 Kms² and spreads northwards beneath the western slopes of the Eastern Ghats as a rough parallelogram dented deeply in its southern, western and northern boundaries. growing seasons to assess the prevalence and incidence of foliar fungal and bacterial diseases affecting Paddy, Groundnut, Red gram, Cotton, Bengal gram are the major Agricultural crops. Mango, Citrus, Banana, Melons, Papaya are the fruit crops. Turmeric, Onion, Chillies, Coriander, Vegetables and Chrysanthemum are other commercial crops grown in the district. (Kondaiah HK and Sreeramulu A, 2014)

Isolation of the pathogenic bacteria

Generally the tissue segment method is used for isolating the organisms that grow on artificial media. An infected host tissue from the advancing margin of the lesion is selected, cut into small pieces of about 2 – 5 mm and transferred to sterile petri dishes. The pieces are surface sterilized with 0.1% mercuric chloride solution for about half to one minute. (Kondaiah HK and Sreeramulu A, 2014. The bits of tissues thus the surface sterilized are transferred on to nutrient agar media in petri dishes. The dishes are incubated at 20-27⁰c temperature and examined daily for the growth of organisms. The bacterial colonies developing from the tissue are transferred into agar slants and allowed to grow.

The tissue sections are transferred to dishes containing sterile distilled water and washed thoroughly to free them from the chemicals.

Result and Discussion

A total of 250 fields were inspected during the three years of survey. The following Bacterial diseases are identified on crop and non crop plants of Cuddapah District during the years 2008-2012. The following bacterial diseases were observed and identified. Among the total of 50 mandals were surveyed, diseases identified to that particular mandals are enlisted in the Table 1.

Different plant parts with disease symptoms were collected and pathogens were isolated. There are 8 different types of bacterial disease viz., Blight, Canker, Red strip, Angular leaf spots, black arm, shot hole, soft rot belonging to 6 crops (paddy, Acid lemon, sugar cane, cotton, neem and tomato) were identified according to the host and symptoms of the disease. The details of the host, pathogen and name of the disease are tabulated below (Table 2). The pathological symptoms can be seen in the Figure 1.

The above isolation method of bacteria was keenly taken to examine organisms growing from the diseased tissue as they develop from the beginning. This survey addresses disease situations in field crops, native ecosystems.

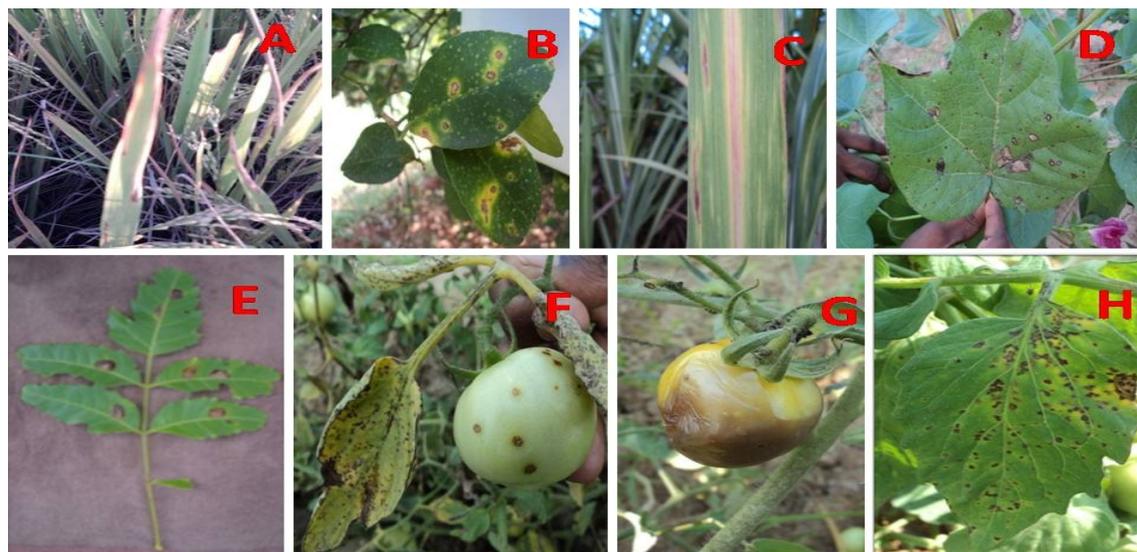
Bacteria can easily spread from one plant to other plants and they remain live in the soil, crop debris and spread to the next crop. These diseases can cause to damage to the host plants, sometimes they can kill the host plants (Ou, S. H. 1972.). Results showed the spread of 8 diseases of 6 crops to in the different mandals. Based on the occurrence of the disease in the different mandals, if precautions can be taken care further spread

of the disease can be avoided. The occurrence of disease per mandal ranged from 1-5. Among the 8 diseases, leaf spot is wide-spread in 43 mandals of the Cuddapah, which indicates its occurrence and dominance in the study area. It is also indicates that the Leafspot is a common disease to the study area. Canker occupied the next position in occurrence. Whereas, angular leafspot was identified only in two mandals namely Atloor and Chintakomma Dinne. Hot hole disease on *Azadiracta indica*. Red strip on *Saccharum officinarum*. Soft rot on *Lycopersicon esculantum*. Bacterial leaf spots on *Lycopersicon esculantum*, *Gossypium herbaceam* Canker disease on Citrus lemon and *Lycopersicon esculantum*. Leaf blight on *Oryza sativa*

Bacteria when spread, if there is no ready host, they hardly remain dormant. So it is a best method for eradicating the particular disease and the study results helps for that. Plant pathogenic bacteria cause many different kinds of symptoms that include galls and overgrowths, wilts, leaf spots, specks and blights, soft rots, as well as scabs and cankers. The means by which plant pathogenic bacteria cause disease is as varied as the types of symptoms they cause (Sarah DE *et al.*, 2008).

Based on the presence of the disease, farmer has to choose the crop in their mandal. For example, the angular leaf spot belongs to the cotton crop, avoiding this crop in the mandals of Atloor and Chintakomma Dinne can help the former. If the data was used properly, and crop selected wisely, the further spread of the disease can be avoided. The new advances in genomics and proteomics will provide information for selecting new targets to develop specific and sensitive techniques for the diagnosis and detection of these bacterial pathogens in plant material. (Lopez MM *et al.*, 2010)

Figure.1 Phytopathogenic effected diseases diagnosed in different mandals of Cuddapah District, India



A. Leaf blight on *Oryza sativa* ; B. Canker disease on Citrus lemon ; C. Red strip on *Sugar cane leaf*. ; D. Angular leaf spot & Blackarm on *Gossypium herbaceum* ; E. Hot hole disease on Neem leaf ; F.Fruit Canker on Tomato ; G. Soft rot on Tomato ; H. Bacterial

Table.1 Check List of Surveyed Disease Crops in Cuddapah District

S.No	Name of the Mandal	Check List of Surveyed Disease Crops in Cuddapah District
1	Atloor	1.Canker 2.Angular leafspot
2	Badvel	1.Leaf spot 2.Red strip 3.Shot hole
3	B.Kodur	1.Canker 2.Shot hole 3.Leaf spot
4	B.Mattam	1.Leaf spot 2.Blight
5	Chapadu	1.Canker 2.Red strip 3.Leaf spot 4.Blight 5.Soft rot
6	Chakrayapeta	1.Canker 2.Shot hole
7	Chennur	1.Red strip 2.Soft rot 3.Leaf spot
8	Chinnamandem	1.Leaf spot
9	Chintakomma dinne	1.Angular leaf spot 2.Soft rot
10	Chitvel	1.Canker 2.Leaf spot 3.Soft rot
11	Duvvur	1.Blight 2.Leaf spot
12	Galiveedu	1.Shot hole 2.Canker
13	Gopavaram	1.Blight 2.Leaf spot
14	Jammalamadugu	1.Shot hole 2.Leaf spot
15	Kadapa	1.Leaf spot 2.Soft rot
16	Kalasapadu	1.Canker 2.Leaf spot 3.Soft rot
17	Kamalapuram	1.Leaf spot 2.Canker
18	Khazipeta	1.Red strip 2.Leaf spot 3.Blight
19	Koduru (R.S)	1.Canker 2.Leaf spot 3.Soft rot 4.Blight

20	Kondapuram (R.S)	1.Canker 2.Leaf spot
21	Lakkireddy palli	1.Canker 2.Leaf spot 3.Soft rot
22	Lingala	1.Canker 2.Leaf spot
23	Mydukuru	1.Canker 2.Soft rot 3.Leaf spot
24	Mylavaram	1.Shot hole 2.Leaf spot
25	Muddanuru	1.Canker 2.Leaf spot
26	Nandalur	1.Red strip 2.Canker 3.Soft rot 4.Leaf spot
27	Obulavaripalli	1.Blight 2.Canker 3.Soft rot
28	Ontimitta	1.Canker 2.Blight 3.Leaf spot
29	Peddammudium	1.Shot hole 2.Leaf spot
30	Penagalur	1.Canker. 2.Leaf spot 3.Soft rot
31	Pendlimarri	1.Angular leaf spot 2.Soft rot
32	Porumamilla	1.Leaf spot
33	Proddutur	1.Canker 2.Soft rot
34	Pulivendula	1.Canker 2.Leaf spot
35	Pullampeta	1.Canker 2.Leaf spot 3.Soft rot 4.Blight
36	Rajampet	1.Canker 2.Soft rot 3.Leaf spot
37	Rajupalem	1.Canker 2.Leaf spot 3.Blight 4.Soft rot
38	Ramapuram	1.Canker 2.Leaf spot
39	Rayachoti	1.Canker 2.Leaf spot 3.Soft rot
40	Sambepalli	1.Leaf spot
41	Siddhavatam	1.Blight 2.Canker 3.Leaf spot 4.Soft rot
42	Simhadripuram	1.Canker 2.Leaf spot
43	Kasinayana	1.Canker 2.Leaf spot 3.Soft rot
44	T.sundupalli	1.Leaf spot
45	Thonduru	1.Canker 2.Leaf spot
46	Valluru	1.Leaf spot 2.Canker 3.Soft rot
47	Vempalli	1.Blight 2.Canker 3.Leaf spot
48	Vemula	1.Canker 2.Leaf spot
49	Veeraballi	1.Leaf spot 2.Canker
50	Veerapunayuni palli	1.Canker

Table.2 Disease and Pathogenesis

S.No	Name of the Disease /symptom	Name of the plant	Botanical name	Causal organism
1.	Blight	Paddy	<i>Oryza sativa</i>	<i>Xanthomonas campestris PV Oryzae.</i>
2.	Citrus Canker	Acid Lemon	<i>Citrus lemon</i>	<i>Xanthomonas campestris citri</i>
3.	Red strip	Sugar cane	<i>Saccharum officinarum</i>	<i>Pseudomonas rubrilineans</i>
4.	Angular leaf spots and Black arm	Cotton	<i>Gossypium herbaceum</i>	<i>Xanthomonas campestris</i>
5.	Shot hole	Neem leaves	<i>Azadiracta indica</i>	<i>Xanthomonas azadiractaadae</i>
6.	Canker	Tomato	<i>Lycopersicon esculantum</i>	<i>Clavibacter michiganense</i>
7.	Soft rot	Tomato	<i>Lycopersicon esculantum</i>	<i>Erwinia caretovera</i>
8.	Leaf spot	Tomato	<i>Lycopersicon esculantum</i>	<i>Xanthomonas campestris</i>

On the basis of field surveys in cuddapah district it can be stated that the major disease problems occurred in cuddapah district. We conclude with crucial actions and safety measures should be taken by Farmers, NGOs, Agricultural scientists and Government by implementing improving strategies for the inspection and control of bacterial diseases. This survey information on the occurrence and severity of diseases affecting dry bean should help prioritize future research needs and breeding programs.

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