

Survey of Chilli Anthracnose; Potential Threat to Chilli Crops a Focus on Bulileka, Labasa, Fiji Island

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Abstract- Chilli is an important vegetable and spice crop worldwide and one of the most important vegetables in Fiji. The major constituent that makes this crop popular, is because it is antioxidant, antibacterial and anti-cancerous. Anthracnose caused by *Colletotrichum spp* is a major problem in Fiji and one of most significant constraints to chilli production worldwide, especially in tropical and subtropical regions. In the present study a survey was conducted to assess the percent disease incidence of anthracnose of chilli in five locations in Bulileka area. The percentage incidence of anthracnose affected fruits under field conditions was more in green fruits which ranges from 65.5% to 78.5%. Therefore the percent disease index (PDI) reveals that the predominance presence of anthracnose is a major constraints to profitable of chilli in Bulileka area.

Index Terms- Capsicum spp, Colletotrichum spp and Percent disease index (PDI).

productivity rate due to anthracnose disease impact. This crop is very significance source of income for Fijian populace. Anthracnose disease of chilli caused by *Colletotrichum spp* has become a serious problem for chilli cultivation in Fiji.

The amount of disease measured as the proportion of the crop population (counted as individual plants or branches or leaves etc.) that is infected (disease incidence) or the proportion of the area of the plant that is affected (disease severity). It is important to maintain national disease lists, for which the current survey was in support. A disease list helps the individual in the country to know which plant pathogen directly affects the parts of chilli plant and use appropriate quarantine and control measures to keep a check in causal agent. Keeping in mind the imperative use of chilli, thus the present survey was aimed to investigate the disease incidence of anthracnose of chilli crop so as an integrated disease management control techniques can be developed.

I. INTRODUCTION

Chilli (*Capsicum spp.*) is a remunerative vegetable, spice cum cash crop worldwide which belongs to the Solanaceae family which represents a diverse plant group. Chilli is used as a spice, condiment, culinary supplement, vegetable and as an ornamental plant. The cultivation of this crop exists for several years as a sustainable form of agriculture in many countries like India, which accounts for 25% of the world's total production of chilli. (FAO, 2010). However, the average productivity of chilli is low as compared to China, Taiwan and Mexico where it yields 3 tons/ha of dry chilli (Peter, 1998).

The sustainability in chilli production is threatened by biotic factors such as insect and diseases (Isaac, 1992), among these anthracnose disease which is caused by *Colletotrichum spp.* is a major economic constraint to chilli production in both tropical and subtropical regions (Than *et al.*, 2008). Anthracnose disease caused by *C. gloeosporioides* belongs to the Kingdom Fungi, Phylum Ascomycota, Class Sordariomycetes; Order Glomerellales and Family Glomerellaceae (Agrios, 2005). Sixty-six species of *Colletotrichum* has been recently described by Hyde *et al.* (2009) to cause plant diseases. *C. gloeosporioides* Penz is so far the most predominant *Colletotrichum sp.* and can attack about 470 different host genera (Cannon *et al.*, 2008).

Anthracnose disease of chilli is mainly a problem on mature fruits resulting in yield losses up to 50 per cent and substantial deterioration in quality parameters (Bosland and Votava, 2003, Pakdeevaporn *et al.*, 2005). According to Fiji Sun Online (2013), chilli continued its export despite reduction of

II. MATERIALS AND METHODS

A survey was carried out in Bulileka area to find out the incidence of anthracnose disease. The incidence of anthracnose diseases were recorded according to the disease assessments done in five location. The study areas were Mani Road, Boca, Urata, Low-cost and Boubale. In all five location 25 chilli plants were assessed out in the field to identify and count the number of chilli fruits were infected. Disease incidence is the number or proportions of plant units that are diseased (i.e. plants, leaves, flower, fruits etc.). The formula used is based on the mean incidence calculated for each area.

PERCENT DISEASE INDEX

$$\text{PDI} = \frac{\text{No of infected fruit in sample}}{\text{Total number of fruit per plant}} \times 100$$

For estimation of fruit area diseased, the whole fruit surface area was considered as 100 and thereby the infected area was determined by eye estimation for percent of disease index (Hossainet *et al.*, 2010). Disease incidence generally tells about the prevalence of the disease in a given areas or host population. Therefore the reason for implementing this survey was necessary to find out the percentage distribution of the pathogen on the host pants.

III. RESULTS

TABLE 1: SUMMARY OF ANTHRACNOSE DISEASE INCIDENCE AT VARIOUS LOCATION IN BULILEKA AREA.

LOCATION		TOTAL NO.OF CHILLI PLANTS SURVEYED	TOTAL NO. OF FRUITS	TOTAL NO. OF FRUITS INFECTED	% DISEASE INCIDENCE
1	MANI ROAD	25	3575	2723	76.2%
2	LOWCOST	25	3560	2333	65.5%
3	BOCA	25	4763	3495	73.4%
4	URATA	25	3657	2692	73.6%
5	BOUBALE	25	3978	3124	78.5%
TOTAL		125	19533	14367	73.6%

TABLE 2: PRESENCES OF ANTHRACNOSE DISEASE IN CHILLI PLANTS AT MANI ROAD AREA.

Location 1	MANI ROAD		
Plant No.	Total no. of fruit/Plant	Total no. of fruit infected/Plant	% Disease incidence
1	156	134	85.9%
2	161	143	88.8%
3	131	119	90.8%
4	145	136	93.8%
5	83	63	75.9%
6	102	86	84.3%
7	201	150	74.6%
8	183	83	45.4%
9	173	129	74.6%
10	153	121	79.1%
11	140	93	66.4%
12	119	83	69.7%
13	178	121	67.9%
14	133	91	68.4%
15	94	72	76.6%
16	71	51	71.8%
17	98	58	59.2%
18	115	87	75.7%
19	131	85	64.9%
20	78	46	59.1%
21	150	126	84.0%
22	253	221	87.4%
23	226	193	85.4%
24	158	123	77.8%
25	143	109	76.2%
TOTAL	3575	2723	76.2%

TABLE 2.1: PRESENCES OF ANTHRACNOSE DISEASE IN CHILLI PLANTS AT LOWCOST AREA.

Location 2	LOWCOST		
Plant No.	Total no. of fruit/Plant	Total no. of fruit infected/Plant	% Disease incidence
1	68	31	45.6%
2	71	52	73.2%
3	143	86	60.1%
4	105	47	44.8%
5	93	71	76.3%
6	112	93	83.0%
7	76	21	27.6%
8	127	73	57.5%
9	119	101	84.9%
10	241	111	46.1%
11	246	203	82.5%
12	212	96	45.3%
13	56	19	34.0%
14	67	43	64.2%
15	167	119	71.3%
16	147	114	77.6%
17	181	97	53.6%
18	197	156	79.2%
19	221	183	82.8%
20	256	122	47.7%
21	171	142	83.0%
22	234	204	87.2%
23	79	57	72.2%
24	93	71	76.3%
25	78	21	26.9%
TOTAL	3560	2333	65.5%

TABLE 2.2: PRESENCES OF ANTHRACNOSE DISEASE IN CHILLI PLANTS AT BOCA AREA.

Location 3	BOCA		
Plant No.	Total no. of fruit/Plant	Total no. of fruit infected/Plant	% Disease incidence
1	221	176	79.6%
2	193	143	74.1%
3	143	121	84.6%
4	156	114	73.1%
5	172	96	55.8%
6	113	95	84.1%
7	213	175	82.2%
8	256	128	50.0%
9	192	151	78.6%
10	179	149	83.2%
11	142	91	64.1%
12	215	191	88.8%
13	153	115	75.2%

14	127	81	63.8%
15	117	87	74.4%
16	257	191	74.3%
17	226	196	86.7%
18	172	102	59.3%
19	161	111	68.9%
20	173	109	63.0%
21	215	178	82.8%
22	261	201	77.0%
23	254	193	75.9%
24	231	169	73.2%
25	221	95	42.9%
TOTAL	4763	3495	73.4%

TABLE 2.3: PRESENCES OF ANTHRACNOSE DISEASE IN CHILLI PLANTS AT URATA AREA.

Location 4	URATA		
Plant No.	Total no. of fruit/Plant	Total no. of fruit infected/Plant	% Disease incidence
1	91	72	79.1%
2	73	56	76.7%
3	167	152	91.0%
4	152	108	71.1%
5	179	94	52.5%
6	161	117	72.7%
7	117	92	78.6%
8	168	110	65.5%
9	94	49	52.1%
10	83	49	59.0%
11	118	81	68.6%
12	173	112	64.7%
13	193	121	62.7%
14	115	96	83.5%
15	207	187	90.3%
16	182	167	91.8%
17	192	132	68.8%
18	154	123	79.9%
19	94	76	80.9%
20	98	73	74.5%
21	172	131	76.2%
22	165	126	76.4%
23	174	132	75.9%
24	193	97	50.0%
25	172	139	80.8%
TOTAL	3687	2692	73.0%

TABLE 2.4: PRESENCES OF ANTHRACNOSE DISEASE IN CHILLI PLANTS AT BOMBALE AREA.

Location 5	BOMBALE		
Plant No.	Total no. of	Total no. of fruit	% Disease

	fruit/Plant	infected/Plant	incidence
1	183	121	66.1%
2	92	81	88.0%
3	183	141	77.0%
4	139	97	69.8%
5	129	91	70.5%
6	183	132	72.1%
7	173	128	73.9%
8	91	56	61.5%
9	84	58	69.0%
10	193	159	82.3%
11	172	99	57.6%
12	90	78	86.7%
13	121	108	89.3%
14	172	153	88.9%
15	183	159	86.9%
16	141	107	75.9%
17	173	116	67.1%
18	124	97	78.2%
19	126	98	77.8%
20	215	185	86.0%
21	213	176	82.6%
22	173	129	74.6%
23	194	173	89.2%
24	210	189	90.0%
25	221	193	87.3%
TOTAL	3978	3124	78.5%

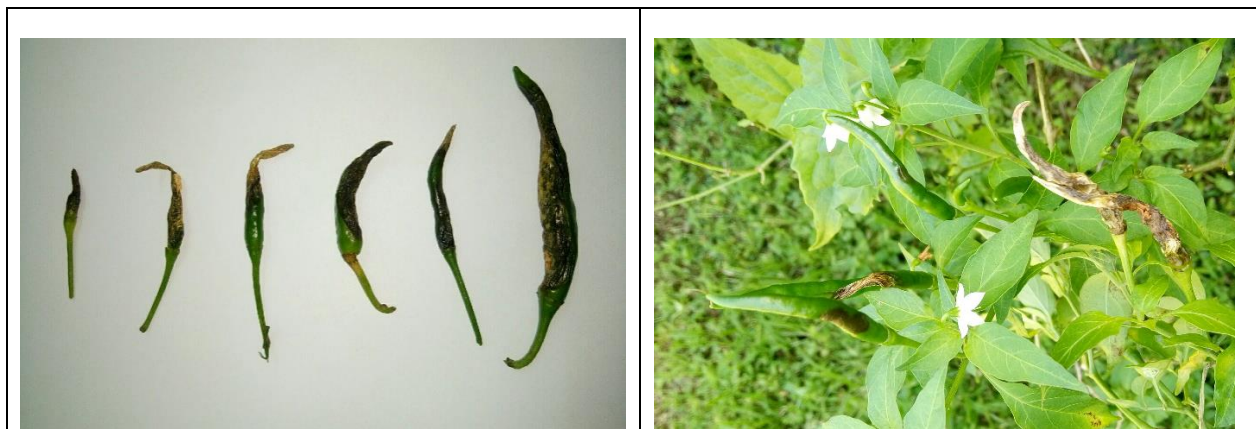


Figure 1 and 2: Severity of anthracnose disease on Chilli fruit

IV. RESULT AND DISCUSSION

Anthracoze lesions starts to appear on green fruit to reach the red ripen stage (Rajapakse&Ranasinghe, 2002). Data on disease incidence was taken from each visited locations in each district by considering the infected fruits to the total number of fruits per plant basis. From various locations visited in Bulileka, maximum disease incidence was recorded 78.5 % from Boubale followed by 76.2 and 73.6 from Mani Road and Urata

respectively, with 73.4% from Boca while minimum incidence of 65.5 was recorded from Lowcost.

Due to changing climatic condition of high humidity and moderate temperature may resulted in increased fruit rot (anthracnose), the climatic condition suit the growth and reproduction of the disease. The spreading of anthracnose disease is due to the direction of prevailing wind while rainfall influence disease depending on the amount, duration, intensity and pattern of rainfall during a crop cycle (Ying, 1987).

Most of the subsistent farmers have cultivated this crop on the basis of generating little income to sustain their livelihood especially in Boubale districts. It is therefore obvious that severity of the disease can be reduced by using alternate integrated disease management friendly to the environment. The presence of anthracnose is an on-going dilemma at small scale farmers of the Bulileka probably due to improper attention paid to the farmer's community by government to manage this disease and abrupt change in weather conditions

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