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EVALUATION OF LEAF DISEASE FUNGI FROM CERTAIN LEGUMINOUS CROP PLANTS

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ABSTRACT

Legumes are one of the most important cash crops of Chhattisgarh. They have a high protein content which play a significant role in human nutrition. A periodical survey was conducted during November 2012 to March 2014 to collect the infected leaves of five rabi leguminous crops viz: *Lathyrus sativus*, *Pisum sativum*, *Pisum arvense, Lens culinaris*, and *Trigonella foenum-graecum*. The samples were collected from five different locations viz. Indira Gandhi Krishi Vishvavidyalaya, Raipur, two villages Jora and Bhatagaon, farm house and kitchen garden of Kushalpur Raipur. Nine fungal pathogens *viz:* two isolates of *Alternaria raphani* (AR), two isolates *Alternaria citri* (AC) a single isolates of *Alternaria tenuissima, Alternaria alternata* (AA), two isolates of *Cladosporium sphaerospermum* (CS), and a single isolate of *Phoma crysanthemicola* (PC) have been isolated from leaves showing dark brown, reddish brown, black dot circular necrotic spots. Degree of infection and disease severity ranged between moderate to severe. However *Cladosporium sphaerospermum* (CS) exhibited mild degree of infection and disease severity on its host plant. Pathogenicity test was proved by Koch's postulate. Conidial size of each fungal pathogen was measured micrometrically.

KEYWORDS: Legume Crops, Isolation

The leguminous crops are known to increase soil fertility, as these can replenish, the soil nitrogen through the activities occurring in their root nodules. The practice in agriculture of taking legume crop alternating with a non-legume one, is aimed towards the enrichment of field nitrogen contents (Prasuna, 1982). It is one of the important source of protein, carbohydrate, dietary fiber and minerals (Tharanathanand Mahadevamma, 2003) Legumes also provide essential minerals required by human being (Grusak, 2002a) and produce health promoting secondary compounds that can protect against human cancer (Grusak, 2002b; Madar and Stark, 2002) and protect the plant against the onslaught of pathogens and pests (Dixon *et al*., 2002; Ndakidemi and Dakora, 2003). In addition to their blood cholesterol reducing effect (Andersen *et al*., 1984), grain legumes generally also have a hypoglycemic effect reducing the increase in blood after a meal and hence, blood insulin. Legumes are therefore, included in the diet of insulin-dependent diabetics (Jenkins *et al*., 2003). The characteristic leaf blight symptom of disease observed was quite different from the disease caused by *Alternaria alternata* (Balasubramanian, 1979). *Alternaria alternata* required relative humidity of 85% and above (Reis *et al*., 2006) and optimum temperature range 25-30°C for conidial production. Morphological and pathogenic variations are known in many fungal pathogens (Koech *et al* 1994; Kumar *et al* 1995).

A survey was conducted during November 2012 to March 2014 to collect infected leaves of legume crops from five locations of Raipur district viz: Indira Gandhi Krishi Vishvavidyalaya, Raipur, two villages Jora and Bhatagaon, farm house and kitchen garden, Kushalpur, Raipur (C.G).

The present paper deals with the survey, isolation and disease intensity of the pathogen of five rabi legume crops. *viz: Lathyrus sativus* (LS), *Pisum sativum* (PS), *Pisum arvense* (PA), *Lens culinaris* (LC), and *Trigonella foenum-graecum* (TFG). Total 9 pathogens have been isolated from these crops.

MATERIALS AND METHODS

The fungi were isolated from infected leaves on Potato Dextrose Agar (PDA) medium (250.0 g potato, 20.0 g Dextrose, 20.0 g Agar, 1000ml distilled water, pH 4.5). Diseased leaves were collected and brought to the laboratory in polythene bags for the isolation and identification of the causal organisms. Infected portion of leaves were cut by means of sterilized razor in small pieces and dipped in 0.01% mercuric chloride solution for 30 seconds. The diseased pieces were then successively washed and placed on sterilized petridishes containing PDA medium. The entire operations were carried out under aseptic conditions. The organisms thus obtained were repeatedly subcultured in order to get pure cultures. The pure cultures were maintained on PDA slants for further studies.

Pathogenicity was proved by attached leaf method to ensure Koch's postulate, and was confirmed by attached leaf method under greenhouse conditions. The leaves were pin pricked using sterilized needle and cultures were inoculated on the respective leaves in

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triplicates under aseptic conditions. Average conidial sizeof each pathogens was were measured micro-metrically.

RESULTS AND DISCUSSION

During field survey the foliar infections were collected and their symptoms were analysed. The foliar disease occurred as spots on leaves. Initially minute, dark brown and reddish brown, black hard, dot sub circular to circular spots appeared. The disease was found to be prevalent in humid weather with temperature around 28°C. Nine different pathogenic fungal organisms have been isolated. Three isolates *Alternaria raphani*, *Phoma crysanthemicola* and *Alternaria citri* (AC) have been obtained from *Trigonella foenum-graecum*. The symptoms appeared were dark brown, circular, necrotic spots and black, hard circular necrotic spots. The degree of infection and disease intensities were found to be moderate. *Alternaria tenuissima* and *Cladosporium sphaerospermum* were obtained from *Lathyrus sativus*. Blight, dark brown necrotic spots were observed in case of *Alternaria tenuissima.* Whereas black, dot spots were observed on the leaves infected by *Cladosporium sphaerospermum.* Degree of infection and disease intensities were found severe and moderate respectively. Similarly, *Alternaria alternata* and *Cladosporium sphaerospermum* were obtained from *Lens culinaris* with dark brown, circular necrotic spots and black dot spots respectively. Degree of infection and disease intensities were found to be moderate and mild respectively. *Alternaria citri* and *Alternaria raphani* were obtained from *Pisum sativum* and *Pisum arvense* which exhibited symptoms of reddish brown, circular necrotic spots and then degree of infection and disease intensities were found to be severe. *Alternaria raphani* showed largest conidial size 49×15 µm. All *Cladosporium sp*. were found to have similar conidial size. Conidial size of *Alternaria alternata, Alternaria citri* (AC), *Alternaria tenuissima* (AS), *Phoma crysanthamicola* (PC), *Alternaria cirti* (AC), *Alternaria raphani* (AR) ranged between 28×15 µm to 41×15 µm.(Table,1). Pathogenicity test (Koch's postulate) was proved by direct inoculating healthy leaves of the respective host plant with conidial suspension and within 8 to 15 days similar symptoms were observed as on naturally infected leaves. The leaves spread with distilled water only did not show any symptoms. The re-isolated causal organisms were identical with that from the naturally affected leaves with necrotic symptoms. The present work has been associated with survey and isolation of fungal pathogens from leguminous crops.

The result indicates that out of nine pathogens *Alternaria* spp. appeared to be the most dominant pathogen. The legume crops are quite susceptible to the fungal pathogens damaging crops to a great extent. Suitable control and protective measures should be taken to prevent these major rabi crops from the microbial invasion so as to get healthy crops of immense nutritive value.(Figure 1& Photo 1)

Table 1: Survey, Isolation, Disease Intensity and Conidial Size of Isolated Pathogens

S. No.	Crop Host	Pathogen	% Disease Intensity	Degree of Infection	Symptoms	Conidial Size
1	*Trigonella foenum-graecum*	*Alternaria raphani* *Phoma crysanthamicola* *Alternaria citri*	50% 60% 60%	Moderate Moderate Moderate	Black hard, circular necrotic spots Black, circular, hard spots Dark brown, circular, spots	41 x 15 µm 39 x 15 µm 30 x 15 µm
2	*Lathyrus sativus*	*Alternaria tenuissima* *Cladosporium sphaerospermum*	80% 60%	Severe Moderate	Blight , dark brown spots Black, pin head like dot spots	33 x 15 µm 30 µm
3	*Lens culinaris*	*Alternaria alternata* *Cladosporium sphaerospermum*	70% 20%	Moderate Mild	Dark brown circular necrotic spots Black dot spots	28 x 15 µm 30 µm
4	*Pisum Sativum*	*Alternaria citri*	80%	Severe	Reddish brown, necrotic spots	39 x 15 µm
5	*Pisum arvense*	*Alternaria raphani*	80%	Severe	Reddish brown, necrotic spots	45 x 15 µm

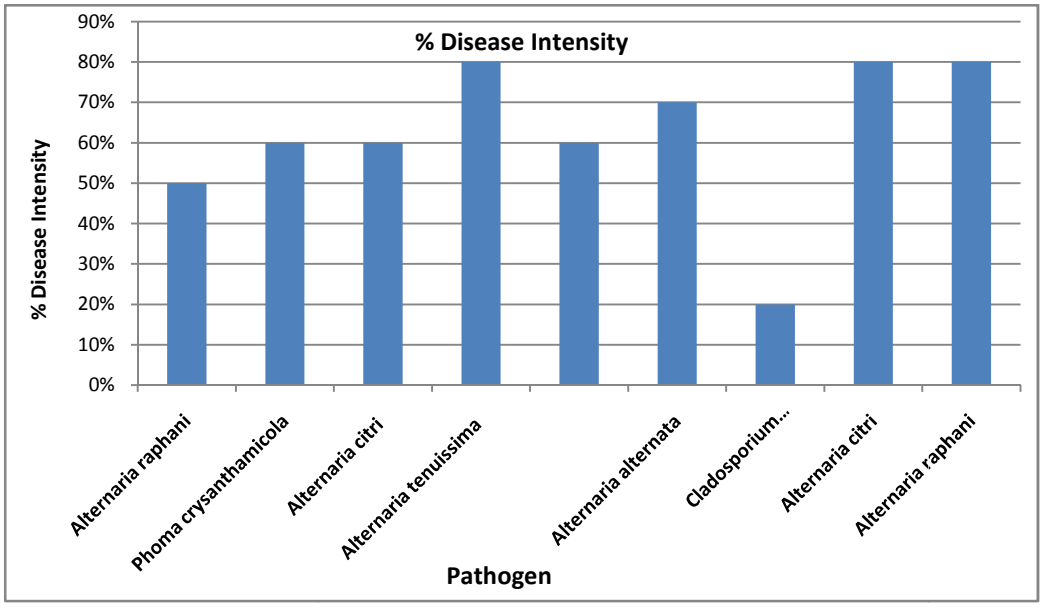
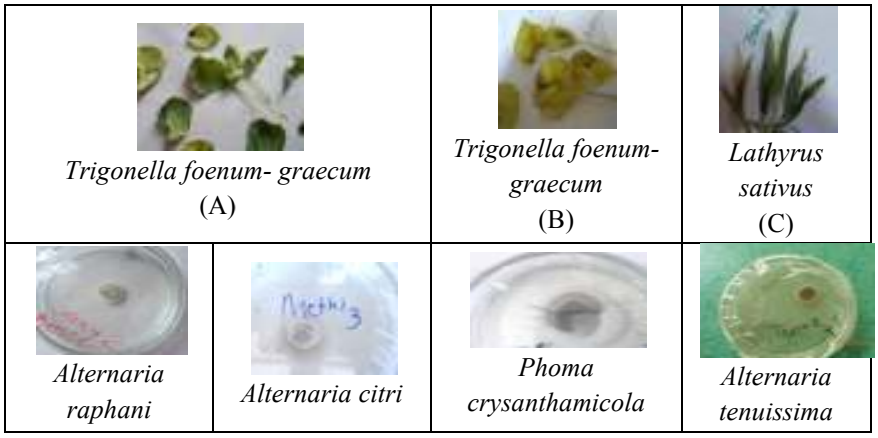


Figure1: Disease symptoms and isolation of the fungal pathogens from different leguminous crops



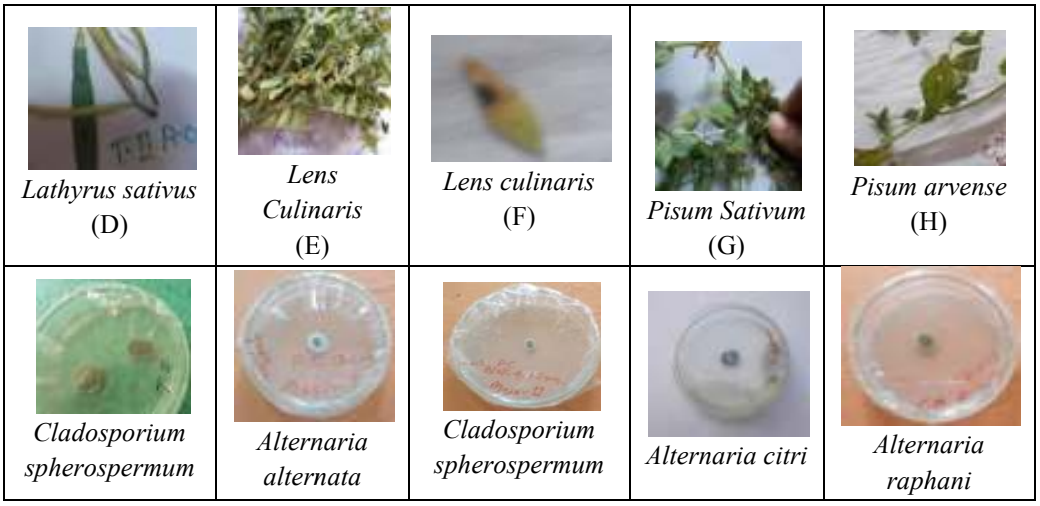


Photo 1: Disease symptoms and isolation of the fungal pathogens from different leguminous crops

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