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CONTROL OF RICE BLIGHT PATHOGEN *XANTHOMONAS ORYZAE* THROUGH HERBAL PLANT EXTRACT

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Keywords:

Rice ,*Cassia occidentalis, Aloe Vera* gel, *Xanthomonas oryzae* and blight disease

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ABSTRACT: Rice is the most widely cultivated food crop over world, whose production is effected by many diseases like as fungal, bacterial and viral. Bacterial blight disease of rice caused by *Xanthomonas oryzae*. Chemical substance like Bordeaux mixture, copper and mercurial compounds have been used. Extensive use of these chemical causes harmful impacts on human and environment. For reducing problems associated to chemical substance, herbal plant like *Aloe Vera* gel and *Cassia occidentals* seed extract can be used for controlling disease cause through *Xanthomonas oryzae* (*Xoo*) in rice crop. The result of this study indicated that the *Aloe Vera* gel and seed extract of *Cassia occidentalis* plants contain some major bioactive compounds that inhibits the growth of the *Xanthomonas oryzae* and provides zone of inhibition, as *Aloe Vera* at 100% concentration provide diameter 14mm zone of inhibition in seed extract of *Cassia occidentalis* at 30mg/ml, 60mg/ml and 120mg/ml provide 5 mm, 9mm and 12mm diameter zone of inhibition respectively as It can be very important, for disease treatment in plants.

INTRODUCTION: Rice is the most widely cultivated food crop over world, whose production is effected by many diseases like as fungal, bacterial and viral. In 1884, bacterial blight in rice, caused by *Xanthomonas oryzae* was first reported in Fukuoka, Japan. Up to date, Bacterial blight is considered to be one of the most destructive disease of rice worldwide, especially in South and Southeast Asia[1]. Approx 50% Intensity of crop lost in all over the world, intensity of crop loss depends on stage of the crop. It reduces grain yield, depending on the, degree of cultivar susceptibility and, on the environment in which crop present.

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Bacterial blight results in yield loss and premature plant death[2]. Chemical substance like Bordeaux mixture, Cu and mercurial compounds have been used. Extensive use of these chemical causes harmful impacts on human and environment. For reducing problem associated to chemical substance, herbal plant like *Aloe Vera* gel and *Cassia occidentals* seed extract can be used for controlling disease cause through *Xanthomonas oryzae* (*Xoo*) in rice crop. Bacterial blight is a vascular disease resulting in a systemic infection-2 that produces tannish-grey to white lesions along the veins. Symptoms of disease were observed at the tillering stage. Two herbal plants were used for checking antibacterial activity against rice plant pathogen *Xanthomonas oryzae* responsible for blight disease were shown below in **(Fig: 1, 2).**

Aloe Vera is well known for its medicinal properties and commercial benefits. Poly-

saccharides in *Aloe Vera* gel show many health benefits [3.] Numerous of the medicinal effects of *Aloe Vera* leaf extracts have been recognized inside the polysaccharides found in the inner leaf parenchymatous tissue biologically active substances like as Vitamins, minerals, enzymes, sugars, anthraquinones, phenolic compounds, lignin, saponins, sterols, amino acids and salicylic acid[4]. *Aloe Vera* inner gel show antibacterial activity against both Gram-positive and Gram-negative bacteria it is used in treatment of many disease such as stomach ailments, gastro-intestinal problems, skin diseases, constipations, radiations injury, inflammatory effect, healing wounds and burns, ulcer and diabetes.[5] Anthraquinones isolated from the exudates of *Aloe Vera* have shown wide antimicrobial activity. *Aloe Vera* also shows antimicrobial activity against *Xanthomonas oryzae*.

FIG 1: *ALOE VERA*

FIG 2: *CASSIA OCCIDENTALIS*

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Cassia Occidentalis

Cassia occidentalis L. is an annual Ayurvedic plant which is used in several traditional medicines to cure various diseases. It's show antimicrobial activity against bacterial and fungal infections[6]. The medicinal value of these it is because of the presence of chemical substance like as Alkaloids, tannins, saponins, glycosides, flavonoids[7].

Biomolecule of these plants origin appears as alternative for the control of these human and plant pathogens chemicals compounds found in the various species have different medicinal effects such as e.g. Alkaloids intercalate with DNA. It is used for treatments of many disease like jaundice , hepatitis, cirrhosis, antioxident, detoxification, and bile stimulant [8, 9]. Antimicrobial activity of these Indian herbs against plant pathogen and treatment of different human disease were reported[10].

MATERIAL AND METHODS:

Material required

a) Nutrient agar media for isolation of *Xanthomonas oryzae*.
b) Mueller Hinton agar medium is used checking anti-bacterial property.
c) Antibiotic disk.
d) Fresh leaf of *Aloe Vera* for gel extraction.
e) Seed powder of *Cassia occidentalis*.

Methodology:

Sample of blight disease (*Xanthomonas oryzae)* infected leaves of *Pusa basmati rice* were collected from biotechnology experimental field of M.N.N.I.T Allahabad shown in **(Fig: 3).**

FIG: 3 RICE BLIGHT INFECTED PLANTS IN BIOTECHNOLOGY EXPERIMENTAL FIELD

Isolation of bacteria *(Xanthomonas oryzae)*

Infected leaves shown in **(Fig: 4)** were collected, infected portion was cut, washed with 70% ethanol for surface sterilization crushed with glass rod. 100 ml nutrient agar medium prepared and pour in the petric plates leave for solidification. Extract were spread on the plates than incubate for 24-48 hour at 30^0 C. Yellowish white colony were observed on the plates shown in **(Fig: 5).**

FIG: 4 INFECTED LEAF WITH *XANTHOMONAS ORYZAE*

FIG: 5 COLONIES OF *XANTHOMONAS ORYZAE*

Characterization of bacteria

- It was done through gram staining it is a gram negative rod shape bacteria observed under microscope.
- Bacterial suspension spread on healthy leaves of rice plant in the field after some time leaves show same symptoms that shown by previously infected leaves.

Extraction of gel from *A. Vera* and seed extract preparation from *cassia occidentalis*.

Gel was extracted from fresh leaves of *Aloe Vera*, seed powder of *Cassia occidentalis* prepared in mortar pestle than antibiotic disk were prepared by applying gel on the disk, different concentration of 30mg/ml, 60mg/ml and120mg/ml was prepared from seed powder of *Cassia occidentalis* and applies on disks.

Detection of anti-bacterial property of *A. Vera* and *Cassia occidentalis* against *Xanthomonas oryzae.*

Mueller Hinton agar medium was used checking anti-bacterial property. Mueller Hinton agar medium (200ml) was prepared in Distill water. Media was pouring in the plate leave for solidification. Four disks were used in which three contains *Aloe Vera* gel, *Cassia occidentalis* and one was control of D/W keep on the plate. Then plates were incubated at 29^0C for 24-38 hour then zone of inhibition were measured. All the media used in the present investigation were obtained from Hi-Media Laboratories Ltd., Mumbai, India.

RESULTS:

Now clear zone of inhibition were observed in 24-38 hour in both plates contain *Aloe Vera* and *Cassia occidentalis* extract were shown in **(Fig: 6** and **Fig: 7, 8, 9)** respectively.

TABLE: 1 ZONE OF INHIBITION MEASUREMENTS

Test Organism	Herbal plants	Zone of inhibition in (dia.mm)		
Xanthomonas Oryzae	*Cassia occidentalis*	30mg/ml, 5mm	6omg/ml 9mm	120mg/ml 12mm
	Aloe Vera	100% 14mm		

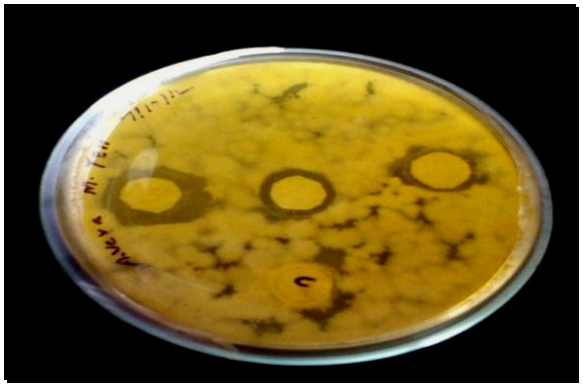

FIG: 6 ZONE OF INHIBITION SHOWN THROUGH *ALOE VERA* AGAIST BLIGHT DISEASE OF PUSA BASMATI RICE

FIG : 7 ZONE INHIBITION SHOWN THROUGH *CASSIA OCCIDENTALIS* AT 30mg/ml CONC. AGAINST BLIGHT DISEASE OF PUSA BASMATI RICE

FIG: 8 ZONE INHIBITION SHOWN THROUGH *CASSIA OCCIDENTALIS* AT 60mg/ml CONC. AGAINST BLIGHT DISEASE OF PUSA BASMATI RICE

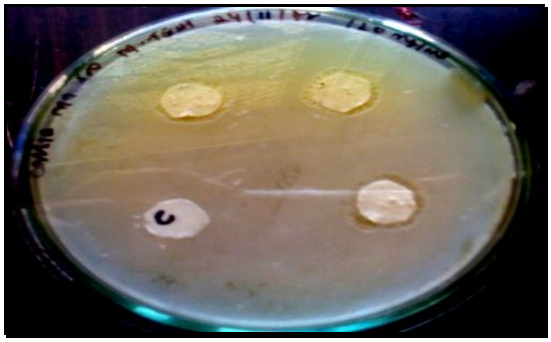

FIG: 9 ZONE INHIBITION SHOWN THROUGH *CASSIA OCCIDENTALIS* AT 120mg/ml CONC. AGAINST BLIGHT DISEASE OF PUSA BASMATI RICE

CONCLUSIONS: *Aloe Vera* gel and *Cassia occidentalis* can be use against blight disease pathogen (*Xanthomonas oryzae*) in rice plants. The result of this study indicated that the *Aloe Vera* gel and seed extract of *Cassia occidentalis* plants contain some major bioactive compound that inhibits the growth of the *Xanthomonas oryzae* and provides Zone of inhibition as *Aloe Vera* at 100% concentration provide diameter 14mm zone of inhibition in above **(Figure: 6)**, seed extract of *Cassia occidentalis* at 30mg/ml, 60mg/ml and 120mg/ml provide 5 mm, 9mm and 12mm dia. Zone of inhibition respectively as shown in **(Figure 7, 8** and **9)**. It can be very important for disease treatment in plants.

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