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ANTI MICROBIAL PROPERTIES OF *Lantana camara* LEAVES

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Abstract

Lantana camara is a perennial weed belongs to the family Verbenaceae. Antimicrobial properties of the leaf of Lantana camara were studied in the laboratory. The results show that the di-ether extract of Lantana camara leaf possesses the property of anti microbial activity. The leaf extract in di-ether suppressed the growth of Aspergillus, Mucor and Rhizopus fungi in culture media for 48 hours. The same leaf extract also prevented bacterial growth in culture media for more than two weeks. Cut tuber decay of potato in the soil caused by soil microbs was effectively prevented when the cut tubers were planted after covering the cut surface with Lantana camara leaves.

keywords: : *Aspergillus* spp., *Penicillium* spp., *Lantana camara*, microbial activity.

1 Introduction

Lantana camara is a perennial semi woody ever green shrub belongs to family Verbenaceae. It is a native of West Indies and introduced to Sri Lanka as an ornamental plant. The plant has a fragrant odour and contains alkaloids, which causes high mortality among livestock. It produces a toxic constituent "Lantadenes" [1]. It has become one of the most widely spread weeds in this country in wastelands and roadsides. It was reported that the leaf extract of *Lantana camara* significantly suppressed the growth of *Aspergillus* spp. and *Penicillum* spp. in oyster mushroom growth on paper beds [2]. It was also found that *L. camara* leaves buried as green

manure suppressed the growth and development of fungal pathogen[3]. If the anti microbial properties are confirmed in *L. camara* leaves, it could be used for many purpose such as botanical pesticides and also to prevent decay of potato cut tubers in soil when they are used as planting materials. In view of the above facts two separate laboratory experiments were conducted to study the anti microbial properties of *L. camara* leaves.

2 Materials method

2.1 Experiment 1

Extract from *Lantana camara* leaves was obtained by using water, ethanol and 99% di-ether as follows: Leaves of 40 g was macerated by using motor and pestle after the surface sterilization of leaves by 0.1% $HgCl_2$. Macerated leaf bulk was mixed with 15 ml of water, ethanol, and di-ether separately and kept in deep freezer for 24 hours. The mixture was then filtered by using sterilized maslin cloth. The extracts of 2%, 5% and 10% in water, ethanol and di-ether and 2.8 g of each of their leaf residue and captan (N- trichloro methyl thiotetrahydrophthalimide) were added separately to the agar media (PDA) as treatments. The isolated and purified fungi viz., *Aspergillus*, *Mucor* and *Rhizopus* and bacteria from decayed potato pieces were inoculated to the agar plates. Fungus was inoculated by spread method and bacteria by spread and streak methods. The treatments were replicated four times in this experiment and the entire experiment was carried out three times in the laboratory.

2.2 Experiment 2

Separate experiment was carried out in the laboratory to study the anti microbial properties of *L. camara* leaf on the microbial activity of the cut surface of potato tubers. This experiment included 9 treatments including control with three replicates. Large potato tubers were cut longitudinally into two pieces. Treated pieces were planted in trays, containing soil from potato growing fields. For each treatment same amount of leaves were used without surface sterilization. Ten cut pieces were planted in each tray of 40 cm x 30 cm. The treatments were

1. Cut surface covered by *L. camara* leaves and planted.
2. Pieces of *L. camara* leaves were added to the soil and planted.
3. Cut surface smeared with leaf extract in water and planted.
4. Leaf extract in water was added to soil and planted.
5. Cut surface smeared by ground leaf mixture and planted.

6. Ground leaf mixture was added to the soil and planted.
7. Cut surface dusted by ash of *L. camara* leaves and planted.
8. Ash of *L. camara* leaves was added to the soil and planted the cut tuber.
9. Cut tubers were planted without any treatment to tuber and soil as control.

The above treatments were kept at the temperature of 26-29^{0}C and relative humidity of 85-90%. Water was sprayed with small hand sprayer at two days interval to maintain the soil moisture. The tubers in all treatments were examined carefully at 15, 25 and 35 days after planting.

3. Results and Discussion

3.1 Experiment 1

The growth of fungi viz, *Aspergillus*, *Mucor* and *Rhizopus* spp was noticed within 24 hours in leaf extract and leaf residue of water and ethanol. However the growth rate (colony size) in these plates was very much reduced compared to the control. The growth rate of fungus was lower in leaf residue than in extracts of water and ethanol. It was also found that the growth rate in culture plate was low in high concentration of extract (10%) than low concentration (5% and 2%). In the leaf extract of di-ether the fungal growth was observed only after 48 hours of inoculation. This is in concurrence with the earlier finding [1]. Research carried out previously also revealed that *L. camara* leaf extract could suppress the mycelial growth of *Penicillium* and *Aspergillus* spp. in agar media (PDA)[2]. Therefore it is apparent that the chemical substance responsible for the anti fungal property of *Lantana camara* is found in the leaf extract of di-ether.

In the bacterial inoculated plates, bacterial growth was observed in the extract and residue of water within 24 hours of inoculation. In the ethanol extract also bacterial growth was observed within 24 hours. But in the leaf residue of ethanol it was observed only after two weeks. In the extract of di-ether bacteria growth was not observed even after two weeks. This is in agreement with the previous finding that the *L. camara* could be used as botanical pesticide due to the presence of fat soluble substance known as "Lantanin"[1].

3.2 Experiment 2

It was observed that in cut tubers covered with *L. camara* leaves did not show any symptom of decay up to 15 days but 10% and 20% decay was seen after 25 days and 35 days respectively.

In treatment where ground leaf mixture smeared to the cut surface, 10% of the tubers decayed after 15 days and 20% and 33% decayed after 25 and 35 days respectively

(Table 1). In all other treatments more than 50% and 80% of the cut tubers decayed after 15 days and 25 days respectively.

Table 1: The level of decay of potato cut tubers treated with Lantana camara at different times after planting)

	Treatments	Percentage of decayed tubers		
		15 DAP *	25 DAP	35 DAP
T1-	Lantana camara leaves placed to cut surface	No decay	10%	20%
T2-	Lantanacamara leaves added to soil	50%	82%	100%
T3-	Water extract of leaf to cut surface	66%	100%	-
T4-	Water extract of leaf added to soil	50%	82%	100%
T5-	Ground leaf mixture to cut surface	10%	20%	33%
T6-	Ground leaf mixture added to soil	56%	92%	100%
T7-	Leaf ash to cut surface	66%	82%	100%
T8-	Leaf ash added to soil	66%	100%	-
T9-	No treatment to cut tuber or soil(control)	50%	100%	-

* DAP- Days After Planting

The results showed that the cut tuber decay in potato was effectively controlled when the leaves of *L. camara* were placed on the cut surface and planted in the soil. Potato tubers germinated within 15 days. Therefore cut tuber decay caused by soil microbs after 25 days may not affect the stem growth. In the laboratory experiment it was found that the di-ether extract of *L. camara* leaves prevented the fungal growth in agar media up to 48 hours and bacterial growth for more than 2 weeks. In considering the results of both experiments it appears that the *L. camara* leaves has anti microbial properties and can be used to prevent the cut tuber decay of potato in soil when cut tubers are used as seed material.

4 Conclusion

The results of these two experiments reveal that the leaf of *Lantana camara* has anti microbial properties and the chemical responsible for the anti microbial activities is soluble in di-ether. Further it is found that the leaves are effective in preventing the cut tuber decay of potato in the soil and these leaves would a potential source to be used to prevent cut tuber decay of potato where no single chemical is available to prevent cut tuber decay caused by fungi and bacteria in soil.

References

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