SHORT COMMUNICATION

SIGNIFICANCE OF PLANT BASED PHYTOEXTRACTS AGAINST SOFT ROT BACTERIA OF POTATO CAUSED BY *ERWINIA CAROTOVORA* SUBSP. *CAROTOVORA* UNDER *IN VITRO* TEST

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Abstract: Potato (*Solanum tuberosum* L.) is one of the most nutritious sources of food in the world. It has been recognized as a wholesome food and the richest source of energy in most of the countries of the world where, it forms an important part of the human diet. Among the various diseases of potato, soft rot caused by *Erwinia carotovora* subsp. *carotovora* is the major potato tuber rot disease. Result revealed against *Erwinia carotovora*, that the extract of Garlic bulb @ 10 per cent produced maximum growth inhibition (60.60%) followed by Mahendi (54.54%) and Lantana leaf extracts (48.10%) respectively.

Keywords: Potato, bacteria, seed

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most nutritious sources of food in the world. Besides cereals, potato is one of the crops, which can supplement food needs of a country. Soft rot is a bacterial disease caused by *Erwinia carotovora* subsp. *carotovora*. Pathogen remains in the soil or in decaying plant debris and in the seed tubers. Bacteria either enter the seed potatoes and lower stems through wounds and injuries, or move directly from contaminated seeds pieces to lower stems. Abundant moisture at the surface of the wound tissue is needed for infection and continued high humidity after infection favors spread of the disease in the plant. The decay of seed pieces in the soil by fungi and other organisms may also provide conditions for blackleg disease to develop. Tubers harvested from plants which were infected during the growing season may develop a soft rot in storage. Looking to the importance and need, different phytoextracts have been studied under *in vitro* condition for the effective management of the soft rot disease of potato. Phytosanitary issues and biosecurity and strategic prevention of deliberate release of crop pests and pathogens are national security priority, which also demands a rapid and efficient diagnostic technology (Schaad *et al.*, 2003).

MATERIAL AND METHOD

Bioefficacy of phytoextracts of eleven plant species having medicinal values was tested *in vitro* by poisoned food technique against soft rot disease of potato.

Fresh and healthy 100g plant parts of each plant species as mentioned in Table - 1 were thoroughly washed with tap water and then with sterile distilled water. These were crushed in grinder mixer by adding 100 ml distilled water to obtain 1:1 extract. The phytoextracts thus obtained were then filtered through double layered sterile muslin cloth in conical flasks and were used without sterilization. The flasks were labelled and stored in the refrigerator for further use. 100 ml of Nutrient Agar (NA) medium was taken for bacterial isolates in flasks of 150 ml capacity, plugged and sterilized by autoclaving at 1.045 kg /cm^2 for 20 minutes. After autoclaving and cooling to about 45 ^{o}C, 10 ml of the respective extracts was mixed thoroughly in the flasks containing 100 ml of NA medium. Medium without respective phytoextracts served as control. All these were poured aseptically into sterile Petri plates replicating four times per treatment. After solidification, the plates were inoculated with 5 mm discs of *E. carotovora* from seven days old culture, which was placed in the centre with the help of sterilized 5 mm cork borer and was incubated at 28 ± 2 ^{o}C temperature for seven days. Observations on radial growth of *E. carotovora* pathogen was measured by averaging two diameters of colony at right angle to one another and the per cent growth inhibition (PGI) was calculated by the following equation (Asalmol *et al.*, 1990).

$$PGI = \frac{C - T}{C} \times 100$$

Where,

P G I	-	Per cent Growth Inhibition
C	-	Growth in control (mm)
T	-	Growth in treatment (mm)

RESULT AND DISCUSSION

Soft rot (*Erwinia carotovora* subsp. *carotovora*)

The results presented in Table-1 revealed that all the phytoextracts inhibited the growth of soft rot pathogen (*Erwinia carotovora* subsp. *carotovora*) significantly as compared to control. The extract of Garlic bulb produced significantly maximum growth inhibition (60.60%) over rest of the phytoextracts tested. The next effective phytoextracts in order of inhibition were extract of Mahendi leaves (54.54%), Lantana leaves (48.10%), Eucalyptus leaves

(45.07%) and Bhoyringni leaves (44.69%). Rest of the phytoextracts exhibited little inhibition on the growth of the pathogen and differed significantly among each other.

Research results corroborate with the report shown by Skinner (1955) found that allicin, a major constituent of *A. sativum* containing sulphur, has strong toxic properties against several bacteria and fungi. Ark and Thompson (1959) showed that aqueous extract and organic solvent extract of garlic (*Allium sativum*) produced zone of inhibition on seeded plates of *Glomerella cingulata, Cladosporium cucumerinum, Erwinia amylovora* and *Xanthomonas vesicatoria.* Alice and Sivaprakasam (1995) showed that garlic clove extracts found equally effective in inhibiting the growth and enzyme production of *Erwinia carotovora*, the causal agent of soft rot of onion. Thus, the present findings are in confirmation with the work of above research workers.

Table 1. Effect of unsterilized extract of different plant species on growth of *Erwinia carotovora* subsp. *carotovora in vitro* test

Sr.No	Phytoextract	Plant part used	Per cent inhibition over control*
			E. carotovora
I	Ardusi	Leaves	34.31(31.35)**
II	Bhoyringni	Leaves	42.22(44.69)
III	Datura	Leaves	14.71(06.00)
IV	Eucalyptus	Leaves	42.43(45.07)
V	Garlic	Bulb	51.39(60.60)
VI	Ginger	Rhizome	10.46(03.01)
VII	Karanj	Leaves	26.38(19.31)
VIII	Mahendi	Leaves	47.87(54.54)
IX	Onion	Bulb	38.48(38.25)
X	Lantana	Leaves	44.17(48.10)
XI	Neem	Leaves	36.90(35.10)
XII	Control (Sterile distilled water)	-	4.05(00.00)
	S.Em. ±	-	0.813
	C.D. at 5%	-	2.319
	C.V. %	-	4.96

* Average of four replications

** Figures in the parenthesis are retransformed values

CONCLUSION

From this experiment it can be concluded that extract of Garlic bulb produced significantly maximum growth inhibition of *Erwinia* bacteria over rest of the phytoextracts tested. Further this extract can be effectively incorporated in different forms for the control the bacteria in the field condition.

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