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IN-*Vitro* EVALUATION OF BOTANICAL EXTRACTS AGAINST *Alternaria solani* CAUSING EARLY BLIGHT OF POTATO

MADHURENDRA KUMAR SINGH[a], RAM CHANDRA[b1], ARADHANA KUMARI[c] AND DEEPAK KUMAR SRIVASTAVA[d]

[abc]Department of Mycology and Plant Pathology, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

[d]Department of Botany, ABRPG College, Anpara, Sonebhadra, Uttar Pradesh, India

ABSTRACT

Potato (*Solanum tuberosum* L.) is an important food crop of the world. The early blight of potato is caused by *Alternaria solani* Sorauer is one of the world's most atrophic diseases. The first symptoms usually appear on older leaves and consist of small, irregular, dark brown to black, dead spots ranging in size from a pinpoint to ½ inch in diameter. As the spots enlarge, concentric rings may form as a result of irregular growth patterns by the organism in the leaf tissue. These botanical extracts were added to the culture media at two concentration viz. 10 % and 30 % and tested by poisoned food technique. Among the four botanical extract evaluated Neem Seed Kernel Extract was significantly superior over the control and other botanical extract. The Result reveals that Neem Seed Kernel Extract was best botanical extract and found highly inhibiting the mycelia growth of *Alternaria solani* at both the concentration viz. 10% and 30% (50% and 99.33% inhibition respectively). This was followed by Neem Leaf Extract, Madar Leaf Extract and Neem Bark Extract accordingly at both concentrations.

KEYWORDS : Fungus *Alternaria solani*, Botanical Extracts, Inhibition Percentage and Mycelial Growth

Early blight is widespread in most areas where potatoes and tomatoes are grown, but is especially prevalent in the tropics and temperate zones. The disease is the potential threat where potatoes are grown under irrigation or during times of heavy dew. Early blight is prevalent in all provinces in South Africa and is a limiting factor in production in late summer. Early blight tuber may occur if tubers wounded during harvest are inoculated by *A. solani* spores found on or near the soil surface. Early blight is one of the three diseases taken into account when selecting new potato varieties in South Africa. Next to the widespread potato disease, late blight caused by *Phytophthora infestans*, early blight has become a noticeable problem for German potato production during the year 2008. A rapid increase in diseases severity has been observed for German potato growing areas (Leiminger Hausladen, 2009). Early blight is caused by *A. solani* and *A. alternata*, which is also the causal agent for brown spot. Early mainly affects potato foliage and leads to leaf necrosis and premature defoliation (Leiminger and Hausladen, 2011). The primary damage of early blight is due to premature defoliation of the plant. Photosynthesis rates increase and respiration rates increase in apparently healthy tissues. Physiological changes are difficult to measure and evaluation of crop loss is based on the level of disease. Early literature (Neergaard 1945) cites yield losses of 5 50%. There is often a discrepancy between damage to foliage and yield loss, which is due to the increase in disease spread at the end of the season, when most of the yield has been produced. When tomato fruit and potato tubers become infected, control of early blight has been shown to increase yield (Van der waals, 2002).

Several effective pesticides have been recommended against this pathogen but they not considered a long-term solution, due to concerns of expense, exposure risks and the hazards of its residues. Moreover, the development of resistance of pathogenic fungi towards synthetic pesticides is a great problem that can affect significantly the efficacy of chemical fungicides. Thus, to find safe, efficacious and environmentally friendly fungicides considered as a source of major concern (Mdee et al., 2009).

Presently, the search for natural products with novel uses, particularly related to disease management is very important task. The use of plant extracts has been shown to be eco-friendly and effective against many plant pathogens (Latha et al., 2009; Moslem and El-Kholie, 2009; Satish et al., 2009; Duru and Onyedineke, 2010; Yanar et al., 2011; Talibi et al., 2012). Many antifungal botanical extracts are recommended to manage the disease and farmers are using them several times to protect their crops. Therefore present investigation was carried out to see the

[1]**Corresponding author**

bio-efficacy of different botanical extracts in *vitro* against *A. solani* causing early blight disease in potato.

MATERIALS AND METHODS

Assay of Antifungal Effects of the Botanical Extract

The botanical extracts viz. Neem leaves, Neem bark, Neem Seed Kernel and Madar leaves were tested against *Alternaria solani*, and measurement of radial growth technique of Phasuda and Varipat (2007) and Nwachukwu and Umechuruba (2001). In *vitro* tests was carried out to effects of botanical extract on radial growth of *Alternaria solani*. Yeast Extract Potato Dextrose Agar media (YEPDA) was used in this study. To every 16 ml and 14 ml of sterilised YEPDA medium was poured in Petri dishes, 4 ml (for 20% conc.) 6 ml (for 30% conc.) of aqueous extract of each plant sample were added. The solution in each Petri dish was gently swirled and allowed to solidify. The extract amended medium in the Petri dishes were inoculated each alone at the centre with 5 ml inoculums-disc of *Alternaria solani* and incubated at 25±2˚C for 8 days. The medium with inoculum disc without any botanical extract served as control.

Percentage inhibition of mycelial growth of pathogen was calculated by given below formula:

$$\% \text{ inhibition of mycelial growth} = \frac{Dc - Dt}{Dc} \times 100$$

Where: Dc = Diameter of control

Dt = Diameter of test

RESULTS AND DISCUSSION

Effect of Botanical Extracts Against *Alternaria solani*

The growth inhibition of mycelium of *Alternaria solani* was tested by treatment of culture by four botanical organic extract viz. Neem Leaf Extract, Neem Seed Kernel Extract, Neem Bark Extract, Madar Leaf Extract and compared with control culture. These botanical extracts were added to the culture media at two concentration viz. 10 % and 30 % and tested by poisoned food technique.

The observations presented in the Table 1 reveals that Neem Seed Kernel Extract was best botanical extract and found highly inhibiting the mycelia growth of *Alternaria solani* at both the concentration viz. 10% and 30% (50% and 99.33% inhibition respectively). Which is followed by Neem Leaf Extract, Madar Leaf Extract and Neem Bark Extract accordingly at both concentrations.

These results are confirmative with findings of Phalisteen et al. (2008); Moslem and EL-Kholie, E.M., (2009); and Hassanein, et al., (2008). They reported that Neem Seed Kernel is most effective in comparison to other used botanical extract. Although, there are large number of botanical extracts are available in the market for biological control of early blight of potato but only some botanical extracts are highly effective against the pathogen. Therefore this investigation will help to farmers for selecting proper botanical extracts for control of early blight of potato.

Table 1 : Effect of Botanical Extracts Against *Alternaria Solani*

Botanical Extract	Radial growth (cm)		Percent inhibition (%)	
	10 %	30 %	10 %	30 %
Neem Leaf Extract	6.30	2.25	30.00	75.00
Neem Seed Kernel Extract	4.50	0.10	50.00	99.33
Neem Bark Extract	7.20	3.60	20.00	60.00
Madar Leaf Extract	6.75	3.15	25.00	65.00
Control	9.00		0.00	
C.D. (P0.001)	3.25 (at 10 %)			
	2.85 (at 30 %)			
S.E.D	1.46 (at 10 %)			
	1.28 (at 30 %)			

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