

IN VITRO EVALUATION OF AYURVEDIC DRUGS AGAINST PATHOGEN *ALTERNARIA SOLANI* CAUSING LEAF SPOT DISEASES IN TOMATO

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Abstract– Man is dependent on plants for almost every need and requirement. Hence, destruction of crop plants due to infection by fungal pathogens has always been an area of prime concern. The use of synthetic fungicides for disease management is harmful for human and animal health as well as soil. They enter the food chain and cause several deleterious effects on biosphere, contributing to significant declines in populations of beneficial soil organisms, soil acidification and compaction, thatch accumulation, and diminished resistance to diseases. Natural plant products are important sources of new agrochemicals for the control of plant diseases. Therefore, the *in vitro* evaluation of Ayurvedic drugs against *Alternaria solani* was carried out at M.P.K.V, Rahuri. Total 29 different Ayurvedic drugs were evaluated at 2%, 5% and 10% concentration by Poison food technique against these pathogens. Among the 29 different ayurvedic drugs, seven Ayurvedic drugs *viz.*, Abhayarishta, Mahamanjishtadi kwath, Vidangasav, Kutajarishta, Bhunimbadi kadha, Amrutarishta and Medari were found 100 % effective at 10 % concentration against *Alternaria solani*.

INTRODUCTION

Chemical control is the most common and prevalent method of disease control. Chemical fungicides have harmful compositions and result in an accumulation of side metabolites and other active substances in products and adverse effects for the environment and consumers (European Food Safety Authority (EFSA) 2019). They enter the food chain and cause several deleterious effects on biosphere, contributing to significant declines in populations of beneficial soil organisms, soil acidification and compaction, thatch accumulation, and diminished resistance to diseases. Thus, current thinking about plant and environment protection suggests alternatives to pesticides and use of other strategies in addition to well-known disease management methods such as crop rotation use of resistant cultivars, planting disease free seeds, biological control etc. for control of fungal diseases. Many studies have proven the antimicrobial activity of various plant species against bacterial diseases (Balestra *et al.*, 2009). There are several traditional agricultural practices followed by farmers to

management of plant diseases. Formulation is a cheap, environmentally safe fungicide made by combining plant extracts and organic materials to control plant diseases. Many techniques of traditional agriculture require validation, such as use of organic materials (cow dung, oil cakes etc.) for the control of plant disease. Kautilya's Arthashastra was probably the oldest document, which described the use of organic materials to control the crop disorders.

Ayurveda is one of the traditional medicinal systems of India. The philosophy behind Ayurveda is preventing unnecessary suffering and living a long healthy life. Ayurveda involves the use of natural elements to eliminate the root cause of the disease by restoring balance, at the same time create a healthy life-style to prevent the recurrence of imbalance. Now a day's most of the people are diverted towards the consumption of ayurvedic formulations. Extracts of certain plants contain alkaloids, tannins, quinines, coumarins, phenolic compounds and phytoalexins, which are known for antifungal activity (Kagale *et al.*, 2005).

Tomato is an important vegetable crop is grown

in India as well as in Maharashtra. Tomato is known to suffer from a number of diseases which affect crop production. This crop is highly susceptible to disease early blight caused by *Alternaria solani*. These are common diseases affecting pathogens of tomato in most of the tomato producing areas. To overcome this pesticide residue problem from vegetables the present work, therefore, aimed *In vitro* evaluation of Ayurvedic drugs against *Alternaria solani* causing leaf spot disease in tomato.

MATERIALS AND METHODS

Isolation of pathogens

The pathogens associated with leaf spot in tomato were isolated on potato dextrose agar and nutrient agar medium by employing tissue isolation method.

Evaluation of Ayurvedic drugs of different concentrations against *Alternaria solani* of Tomato

Three flasks of capacity 100 ml containing 20 ml of PDA media each separately were sterilized and

poured in sterilized Petri plates. Ayurvedic drugs 0.4 ml, 1ml and 2 ml were added in those plates separately before they solidify for 2, 5 and 10 % concentration respectively. A disc (4 mm) of pure culture of *Alternaria solani* was taken and then inoculated to the plates. A control was prepared by just inoculating the fungal disc in PDA plate without any ayurvedic drug. The plates were kept at 25-27 °C and the fungus was allowed to grow. The observations were recorded after seven days when the fungus in control plate was grown completely.

RESULTS AND DISCUSSION

Effect of Ayurvedic drugs on *Alternaria solani* at 2%, 5% and 10% concentration

The efficacy of 29 Ayurvedic drugs were evaluated *in vitro* for the control of *Alternaria solani* at three different concentrations viz., 2 %, 5 % and 10 %. Under present investigations the results thus obtained are presented in Table 2.

Table 1. Ayurvedic drugs used in plant protection studies

Sr. No.	Drugs	Uses in human medicine
1.	Abhayarishta	Treatment of piles
2.	Mahamanjishtadi kwath	Treatment of skin diseases
3.	Vidangasav	Helps to expel intestinal worms and related problems
4.	Kutajarishta	Widely used in treatment of diarrhea, dysentery, fever, bleeding disorders of intestine
5.	Kumaryasav	Used in treatment of gastritis, urinary tract disorders
6.	Ashokarishta	Extensively used in heavy menstrual bleeding and related problems
7.	Arjunarishta	Herbal heart tonic
8.	Divya Godhan ark	Useful in treatment of liver, stomach, diabetes, eczema
9.	Sarasvatarishta	Good memory tonic and anti-aging
10.	Pathyadi kwath	Widely used in treating headache, earache, toothache
11.	Mahasudarshan kadha	Used in treatment of chronic fever like malaria, chickengunia
12.	Bhunimbadi kadha	Treatment of acid-peptic disorder
13.	Drakshasav	Used in treatment of piles, fistula, indigestion, bleeding disorder
14.	Ashwagandharishta	Used in treatment of sexual disorder, depression
15.	Patrangasav	It is uterine tonic
16.	Lohasav	Treatment of iron deficiency and anemia
17.	Khadirarishta	Widely used in treatment of skin diseases
18.	Amrutarishta	Treatment of fever
19.	Chandanasav	Mainly used for urinary disorders and kidney diseases
20.	Maharsnadi kadha	Treatment of joint pain, arthritis
21.	Medari	Best weight loss supplement
22.	Takrarishta	Used in treatment of low digestion strength, piles
23.	Gokharu kadha	Effective in urinary diseases, kidney stone and male impotency
24.	Paripathadi kadha	Widely used in treatment of all types of headache, migraine
25.	Triphala kadha	Useful in infective hepatitis
26.	Bhallatakasv	Treatment of asthma
27.	Jambasav	Treatment of diabetes
28.	Somasav	Effective in asthma and bronchitis
29.	Amla Ras	Skin, hair treatment

Among 29 Ayurvedic drugs, not a single drug was found to be effective against *Alternaria solani* at 2% concentration as compared to control after 7 days of inoculation. It was observed that among 29 Ayurvedic drugs, only Bhunimbadi kadha showed 66.11 percent inhibition of *Alternaria solani* as compared to control after 7 days of inoculation. While rest of the Ayurvedic drugs were failed to inhibit the pathogen *Alternaria solani* at 5% concentration.

At 10% concentration, among all Ayurvedic drugs, Abhayarishta, Mahamanjishtadi kwath, Vidangasav, Kutajarishta, Bhunimbadi kadha, Amrutarishta and Medari showed 100% percent inhibition over the growth of *Alternaria solani* as compared to control after 7 days of inoculation. While rest of the Ayurvedic drugs were not effective

against the pathogen *Alternaria solani*.

These results are in confirmation with the findings of earlier workers such as Saba *et al.* (2010) studied the antifungal activity for several medicinal plants against the early blight fungus (*Alternaria solani*). The inhibitory effect of these extracts was seen on the radial mycelial growth. Tambekar and Dahikar (2011) also reported that in Ayurveda, various herbal preparations are clinically used to prevent or cure infectious diseases. Ravikumar and Garampalli (2013) reported that aqueous extracts of 39 plants selected from local flora were evaluated for antifungal potential against *Alternaria solani*, causing early blight of tomato, at 4 % concentration in Potato Dextrose Agar by poison food technique. Out of these, 13 plant extracts significantly reduced the mycelial growth of the pathogen.

Table 2. Effect of Ayurvedic drugs on growth of *Alternaria solani* at 2%, 5% and 10% Concentration.

Sr. No.	Treatment details	Concentrations					
		2%		5%		10%	
		Mean	Per cent inhibition	Mean	Per cent inhibition	Mean	Per cent inhibition
1.	Control	90.00	-	90.00	-	90.00	-
2.	Abhayarishta	90.00	-	90.00	-	0.00	100.00
3.	Mahamanjishtadi kwath	90.00	-	90.00	-	0.00	100.00
4.	Vidangasav	90.00	-	90.00	-	0.00	100.00
5.	Kutajarishta	90.00	-	90.00	-	0.00	100.00
6.	Kumaryasav	90.00	-	90.00	-	90.00	-
7.	Ashokarishta	90.00	-	90.00	-	90.00	-
8.	Arjunarishta	90.00	-	90.00	-	90.00	-
9.	Divya Godhan ark	90.00	-	90.00	-	90.00	-
10.	Sarasvatarishta	90.00	-	90.00	-	90.00	-
11.	Pathyadi kwath	90.00	-	90.00	-	90.00	-
12.	Mahasudarshankadha	90.00	-	90.00	-	90.00	-
13.	Bhunimbadi kadha	90.00	-	30.50	66.11	0.00	100.00
14.	Drakshasav	90.00	-	90.00	-	90.00	-
15.	Ashwagandharishta	90.00	-	90.00	-	90.00	-
16.	Patrangasav	90.00	-	90.00	-	90.00	-
17.	Lohasav	90.00	-	90.00	-	90.00	-
18.	Khadirarishta	90.00	-	90.00	-	90.00	-
19.	Amrutarishta	90.00	-	90.00	-	0.00	100.00
20.	Chandanasav	90.00	-	90.00	-	90.00	-
21.	Maharsnadi kadha	90.00	-	90.00	-	90.00	-
22.	Medari	90.00	-	90.00	-	0.00	100.00
23.	Takrarishta	90.00	-	90.00	-	90.00	-
24.	Gokharu kadha	90.00	-	90.00	-	90.00	-
25.	Paripathadi kadha	90.00	-	90.00	-	90.00	-
26.	Triphala kadha	90.00	-	90.00	-	90.00	-
27.	Bhallatakasv	90.00	-	90.00	-	90.00	-
28.	Jambasav	90.00	-	90.00	-	90.00	-
29.	Somasav	90.00	-	90.00	-	90.00	-
30.	Amla Ras	90.00	-	90.00	-	90.00	-

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