



Effect of medicinal plant extracts and some soil additives on disease incidence of ramularia blight of fennel (*Foeniculum vulgare* Mill.)

Dr. Anamika Parashar^{1*}, Dr. Payal Lodha²

¹ MPS International, Tilaknagar, Jaipur, Rajasthan, India

² Department of Botany, Plant Pathology, Tissue-Culture and Biotechnology Laboratory, University of Rajasthan, Jaipur, Rajasthan, India

Abstract

One of the most significant diseases, Ramularia blight is brought on by *Ramularia foeniculli* and results in significant yield loss due to the fennel plants' reduced ability to photosynthesize. Extracts from ten different plant species have been found to be effective in preventing blight on *Foeniculum vulgare* Mill. The majority of the plant extracts significantly reduced the disease when used at various concentrations (10%, 25%, and 50%) compared to the control. *Azadirachta indica* and *Datura* leaf extracts were proved to be incredibly effective when compared to other plant extracts. The extracts were found to work better at larger concentrations. The proportion of illnesses was also significantly reduced by adding additional chemicals and a few oil cakes to the soil. So, compared to cotton, mustard, til, or control, fennel grew better when treated with Biovita, Sawdust, and Neem cake. When it came to preventing crop disease, neem oil cake fared better than the others.

Keywords: foeniculum vulgare, disease control, ramularia blight

Introduction

The fennel plant, *Foeniculum vulgare* Mill., is believed to have originated in the Mediterranean and Near East. It is a member of the Apiaceae (Umbelliferae) family. Fennel is cultivated throughout the temperate and sub tropical region in the world mainly in Romania, Russia, Hungary, Germany, France, Italy, India, Srilanka, Malaysia, Japan, Argentina and USA [1]. Rajasthan has a large number of fennel growing areas, Malhotra [2]. Fennel seeds can be used as a spice or condiment in pickles, curries, and other dishes. Fennel seeds also have a number of therapeutic benefits [3]. In our country, Ramularia blight is a significant disease causing higher crop losses to fennel [4]. Productivity of the fennel crop is very low in India against its potential yield one of the key reasons for the lower productivity is Ramularia blight disease. Ramularia blight disease caused by *Ramularia foeniculli* is one of the most important diseases and causes tremendous yield loss due to reduction in photosynthetic capacity of the plants [5, 6]. After a severe infection, the pathogen weakens the host plant, resulting in significant output losses. The disease is primarily airborne and, in comparison, only manifests itself later in the crop's development, before harvest and maturation. The incidence of the disease is influenced by environmental factors such as moisture, relative humidity, temperature, weather, and air flow [6, 7, 8]. Stages of plant development also affect the disease incidence and play a key role in the appearance of the Ramularia blight disease. The most well-known and effective technique of managing plant diseases is the use of resistant sources in plant breeding programmes. In the present study, bio-control methods, such as the application of soil additives and plant extracts to fennel, were used to control the Ramularia blight disease.

Materials and Methods

To ascertain the impact of soil organic amendments on the emergence of disease, field tests were conducted. Twenty days prior to seeding, various oil cakes and additives were mixed into the soil. The amount of oil cakes and additives utilized per hectare was 25 quintals each. The soil was completely combined with the powdered oil cakes. Cakes treated without oil were used as a control. Without the use of inoculum, seeds were planted in a pot. The onset of the disease at various stages was observed.

The purpose of the experiment was to assess the effectiveness of 10 different plant species' extracts in preventing fennel Ramularia blight. 50 grams of fresh leaves from several plants, including Neem, *Aloe vera*, *Bougainvillea*, *Lantana depressa*, *Calatropis procera*, *Datura*, *Vinca rosea*, *Ricinus communis*, *Citrus lemon*, and *Nerium indicum*, were gathered and repeatedly rinsed with fresh water after being first cleansed with 70% ethanol. In a pestle and mortar, the leaves were thoroughly crushed with 50 cc of sterile distilled water. Through a two-layered muslin fabric, this macerate was strained. The extracts were centrifuged at a modest speed (1000 rpm for 15 minutes). The resulting filtrate or supernatant was regarded as 100 percent, and to acquire the necessary concentrations (10%, 25%, and 50%), clear supernatants were diluted with sterile distilled water. The plants were sprayed for the first time when they were 45 days old, again at the beginning of the disease, and again 15 days later. The percentage of illness intensity for each spray was calculated using the method [9].

Results and Discussion

Soil amendments significantly reduced the percentage of sickness (oil cakes and various chemicals). The best one among them for preventing crop disease was neem oil cakes followed by sawdust and biovita. All of these soil modifications benefitted the plants to develop better than they would have otherwise. Neem cake saw dust, and biovita therefore produced superior results than cotton cake, mustard cake, til cake, and control. Overall, the fennel plants grew better as a result of the alteration. Neem cake was also found to lessen the symptoms of *Alternaria* blight in potatoes ^[10].

Extracts from 10 different plant species were found to have beneficial effects. When compared to the control, the majority of plant extracts reduced the disease by 10%, 25%, and 50%, respectively. Leaf extracts from *Azadirachta indica* and *Datura* was shown to be extremely effective. The extracts worked better at larger concentrations. Leaf extracts of *Vinca rosea*, *Bougainvillia*, *Nerium indicum*, *Lantana depressa*, and *Calatropis procera* were shown to be somewhat useful, while being less effective than the leaf extracts previously mentioned in preventing the *Ramularia* blight of fennel. Many other researchers discovered comparable results for blight disease in many plants, such as ^[11] evaluated plant extracts for controlling blight in tomato ^[12], while ^[13, 14] also reported similar findings. Antifungal properties of mint plant extracts for management of blight disease were reported ^[15, 16]. Many experiments observed the effects of plant extracts on potato infected with *Alternaria* blight, ^[17] demonstrated the effectiveness of leaf extracts against blight and wilt ^[18].

Table 1: Effect of oil cake and some additives on *Ramularia* Blight

Oil cakes additive	Effect on control of powdery mildew
Til cake	+
Mustard cake	+
Cotton cake	+
Saw dust	++
Biovita	++
Neem cake	+++

Table 2: Efficacy of some plant extracts against *Ramularia* Blight of fennel (*Foeniculum vulgare* Mill.)

S. No.	Plant extract	Conc. %			Disease intensity %					
		10	25	50	2017-18			2018-19		
1.	<i>Datura</i>	10	25	50	55	52.5	50	53	51.50	49.0
2.	<i>Calotropis procera</i>	10	25	50	62	61.5	60	60.5	60	59
3.	<i>Lantana depressa</i>	10	25	50	60	60	59	60	59.5	59
4.	<i>Citrus lemon</i>	10	25	50	59	56.5	55	59.5	56	55
5.	<i>Aloevera</i>	10	25	50	59.5	56	54.5	58	55	53.5
6.	<i>Nerium indicum</i>	10	25	50	61.5	61	59.5	61	60	60
7.	<i>Vinca rosea</i>	10	25	50	62	61	59.5	62	59.5	59
8.	<i>Neem</i>	10	25	50	51	50	48	52.5	50	48
9.	<i>Bogunvillia</i>	10	25	50	63	62.5	61	62.5	61	61
10.	<i>Riccinus communis</i>	10	25	50	58	55.5	54	58.5	54	53

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Conflict of interest

None

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