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Effect of different sowing dates and cultivars on the incidence of alternaria leaf blight in ajwain (*Trachyspermum ammi* L.)

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Abstract

The field experiment was conducted during the year 2018-19 to study the effect of different sowing dates and cultivars on the incidence of alternaria leaf blight disease in Ajwain (*Trachyspermum ammi* L.). The experiment was laid out in Strip plot design with three replications. The treatment consisted of five sowing dates (July, August, September, October and November) and three varieties (AA-1, AA-2 and Lam Sel-1). The results revealed that maximum disease incidence (27%) was observed in early sowing period. July sown crop attained its grand vegetative growth, which coincided with high relative humidity and frequent rainfall, which led to higher disease incidence. Whereas, the minimum disease severity (11.31%) was recorded in November. Among the varieties the maximum disease incidence (19.84%) was observed in AA-2 variety and least incidence (13.10%) was recorded in Lam Sel-1. This variation in disease incidence may be due to resistant mechanisms in the varieties.

Keywords: Ajwain, alternaria leaf blight, incidence, sowing dates and varieties

Introduction

Ajwain (*Trachyspermum ammi* L), a member of the Apiaceae family, is a spice plant native to Egypt and widely cultivated in India, Iran, and Afghanistan. Known as Bishop's weed or Carom, it has various local names such as Ajowan in Hindi and Oma in Kannada.

Ajwain is an annual herb that grows 90-120 cm tall. It features light brown, aromatic fruits and has a branching, erect form. The plant's leaves are compound and pinnately divided, and its small, white flowers are arranged in compound umbels. Flowers are protandrous in nature and therefore 70-77 per cent cross pollination is reported with honey bees as they are main pollinators (Tiwari and Agarwal., 2004) ^[6].

The seeds of ajwain are valued for their antispasmodic, stimulant, and carminative properties. They are used in traditional medicine to treat various ailments including indigestion, diarrhoea, and respiratory issues. The seeds contain volatile oil (2-5%) rich in thymol (35-60%), which imparts a distinctive spicy aroma and flavour. This oil has several medicinal properties including antimicrobial and antioxidant effects (Dubey and Kashyap, 2015) ^[1].

Ajwain is primarily grown in Rajasthan, Telangana, Gujarat, and Andhra Pradesh, with recent cultivation expanding in Karnataka. Despite its high demand, ajwain cultivation is less prominent compared to major spices like cumin and coriander.

Ajwain's productivity is relatively low due to limited research and development. There's a need for standardized cultivation practices, particularly for non-traditional regions like North Karnataka. Factors such as sowing time and climatic conditions significantly affect yield, necessitating further study on suitable genotypes and agro-techniques for optimal production in various regions.

The timing of sowing can influence the prevalence and severity of Alternaria leaf blight. Early or late sowing may expose plants to conditions that favour fungal growth. For example, sowing too early may result in seedlings being vulnerable to early disease outbreaks, while late sowing could coincide with favourable conditions for fungal spores.

Different sowing dates affect plant exposure to environmental factors like temperature and humidity, which can impact the development of the disease. Adjusting sowing dates to avoid periods of high humidity or excessive rainfall can help manage the disease.

Different cultivars of ajwain have varying levels of resistance to *Alternaria* leaf blight. Some cultivars may be more resistant to the disease, reducing the extent of damage and maintaining better yield. Choosing resistant or tolerant cultivars can significantly reduce the impact of *Alternaria* leaf blight. This is because resistant varieties are less likely to suffer severe symptoms, which helps in preserving plant health and yield. *Alternaria* leaf blight can adversely affect ajwain yield by reducing leaf area, which impairs photosynthesis and overall plant health. Sowing dates that align with favourable conditions for the disease and selecting susceptible cultivars can exacerbate the problem. Conversely, optimizing sowing times to avoid peak disease conditions and choosing resistant cultivars can help mitigate the impact on yield.

Material and Methods

The study on ajwain was conducted during the *kharif* and *rabi* seasons of 2018-19 at the Spice Unit, MARS, UAS, Dharwad, to examine the effects of different sowing dates and cultivars on *Alternaria* leaf blight incidence. The experiment was arranged in a Strip Plot Design with three replications, incorporating five sowing dates (July, August, September, October, and November) and three cultivars (AA-1, AA-2, and Lam Sel-1). The land was ploughed, harrowed, and brought to a fine tilth. Well-decomposed farmyard manure was applied at a rate of 20 tonnes per hectare as a basal dose. The recommended fertilizer dose (100:50:50 NPK kg/ha) was applied using urea, DAP, and MOP. Seeds were sown according to the treatment plan. Upon seedling emergence, excess seedlings were thinned to maintain 30 cm spacing within rows. Initial light irrigation was followed by regular irrigation based on the crop's needs. Five plants per treatment and replication were randomly selected to record the following observations.

Alternaria leaf blight disease severity (PDI)

The *Alternaria* leaf blight disease noticed on the crop was recorded by using disease scoring scale of 0-5 (Jaiman *et al.*, 2013)^[2] and per cent of disease index (PDI) was calculated by the formula of Wheeler (1969)^[7].

$$\text{Percent disease index (PDI)} = \frac{\text{Sum of individual ratings}}{\text{No. of leaflets assessed}} \times \frac{100}{\text{Maximum disease grade}}$$

Based on the PDI the genotypes were grouped into following six categories to indicate the type of reaction (Jaiman *et al.*, 2013)^[2].

Grade	PDI	Reaction
0	0	Immune
1	1-5	Resistant
2	6-20	Moderately resistant
3	21-40	Moderately susceptible
4	41-70	Susceptible
5	71-100	Highly susceptible

The experimental data were subjected to statistical analysis of variance according to Panse and Sukhatme (1995)^[4]. Statistical significance was tested by F value at five per cent level of significance. Critical differences at five per cent were worked

out, where “F” test was found significant.

Results

Alternaria leaf blight disease incidence (PDI)

The data pertaining to *Alternaria* leaf blight disease incidence was significantly influenced by sowing time and varieties are presented in Table 1. Among different sowing dates, the minimum disease severity (11.31%) was recorded in November which is on par with October sown crop (11.87%) and September sown crop (12.78%) whereas, significantly the higher disease severity was recorded by July sown crop (27%). Among the varieties, significantly the lowest disease severity was recorded in Lam Sel-1 (13.10%) whereas, AA-2 recorded significantly the highest disease severity (19.84%). Among the interactions, the lowest disease incidence was recorded in November sown crop with Lam Sel-1 (10.67%) which is on par with October sown crop with AA-2 (11.27%), October sown with Lam Sel-1 (11.33%), November sown with AA-2 (11.60%) and November sown crop with AA-1 (11.67%), whereas, July sown crop with AA-2 (41.67%) recorded the highest disease severity.

Discussion

Alternaria blight is a one of the important diseases of ajwain. The incidence of *Alternaria* leaf blight in ajwain varied significantly among different sowing dates. Maximum disease incidence (27%) was observed in early sowing period. July sown crop attained its grand vegetative growth, which coincided with high relative humidity and frequent rainfall, which led to higher disease incidence. This variation in disease incidence might be due to environmental conditions congenial for disease incidence during that particular sowing period. Though July sowing recorded maximum diseases incidence, yield was not much affected but appearance of seeds was affected (black coloured seeds) whereas, August sown seeds produced better quality seed with yield on par with July sowing. The plants of latter sowing date escaped the congenial conditions for disease occurrence. Kumawat *et al.* (2017)^[3] in fenugreek crop also reported that, disease development was more in early sowing dates as compared to delayed sowing. Similar results were also reported by Patel *et al.* (2018)^[5] in dill.

Table 1: Effect of dates of sowing and varieties on disease severity

Dates of sowing	Per cent disease index (PDI)			Mean
	V ₁ (AA-1)	V ₂ (AA-2)	V ₃ (Lam Sel-1)	
D ₁ (July)	22.67	41.67	16.67	27.00
D ₂ (August)	20.67	23.00	14.50	19.39
D ₃ (September)	14.33	11.67	12.33	12.78
D ₄ (October)	13.00	11.27	11.33	11.87
D ₅ (November)	11.67	11.60	10.67	11.31
MEAN	16.47	19.84	13.10	16.47
For comparing means of	S.Em.±		C.D. at 5%	
Dates of sowing	0.781		2.546	
Varieties	0.535		2.102	
Interaction	1.087		3.260	

Conclusion

The research on the effect of sowing dates and varieties on the incidence of *Alternaria* leaf blight disease in ajwain highlights that both factors play a crucial role in disease management. Adjusting sowing dates can help avoid peak infection periods, thereby reducing disease incidence. Additionally, selecting resistant varieties significantly mitigates disease impact and

enhances crop health. These findings emphasize the need for integrated management strategies that combine optimal sowing practices with the use of resistant varieties to effectively control *Alternaria* leaf blight and improve ajwain productivity. Future research should focus on further refining these strategies and exploring additional measures to manage this disease.

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