Original Research Article

A study on the prevalence of Sclerotium wilt of brinjal in northern Karnataka

Aims: The Sclerotium wilt of brinjal caused by *S. rofsii* is an important disease and occurs severely in the brinjal growing areas of northern Karnataka. To gain knowledge about the prevalence of sclerotium wilt of brinjal in different districts of northern Karnataka and the factors that contribute to the disease occurrence following study was conducted.
Study design: Roving survey
Place and Duration of Study: The laboratory studies were conducted in the Department of Plant Pathology, College of Agriculture, University of Agricultural Sciences, Dharwad during rabi 2020-21.
Methodology: A roving survey was conducted in five northern Karnataka brinjal growing districts during rabi 2020-21, observing Sclerotium wilt incidence and calculating percentages using Wheeler's formula (1969). The survey collected data was used to reveal a correlation between disease incidence and soil type, irrigation type, mulch type, and crop stage.
Results: The survey conducted in five districts of northern Karnataka (Belagavi, Bagalkot, Dharwad, Haveri and Gadag) revealed that maximum disease incidence of 35.07 per cent was recorded in Narendra village of Dharwad district followed by Nulageri village (17.71%) of Haveri district. No disease incidence was observed in Hanchinal village of Belagavi district and Pettur village of Bagalkot district. The average mean of district for Sclerotium wilt of brinjal was also recorded and results revealed that, Dharwad district showed maximum per cent disease incidence (12.39%) followed by Haveri (9.03%), Gadag (7.93%) and the least per cent disease incidence (6.89%) was recorded in Bagalkot district.
Conclusion: A study on brinjal sclerotium wilt found that edaphic factors and agronomic practices, such as flooded irrigation and lack of mulching, contribute to high disease incidence in all five districts. Flooding spreads inoculum, while mulching improves soil temperature and restricts sclerotial germination. The fruiting and flowering stages of crops are most susceptible to disease due to nutrient imbalance and *S. rolfsii* invasion, urging the need for integrated management strategies to reduce brinjal sclerotium wilt.

Keywords: Sclerotium wilt, roving survey, disease incidence, brinjal.

1. INTRODUCTION

Brinjal or eggplant (*Solanum melongena* L.) is an important solanaceous crop of sub-tropics and tropics. It is known as king of vegetables in India. It is an important vegetable crop of Bangladesh, India, China and Philippines. In India brinjal is being grown in an area of 727 thousand hectares with production of 12,680 thousand metric tonnes and productivity is 17.4 tonnes/ha. In Karnataka brinjal is grown in an area of 17.04 thousand hectares with production of 431.80 thousand metric tonnes and productivity accounts for 25.34 tonnes/ha [1].

The fruits of brinjal are widely consumed in various culinary preparations and are rich source of nutrients. It is low in calories and fats, contains mostly water, protein, fiber and carbohydrates. It is a good source of minerals and vitamins and is rich in total water soluble sugars, free reducing sugars, amide proteins, anthocyanin, phenols and glycoalkaloids. The nutritional value per 100 g of brinjal fruit contains 92.70 per cent moisture, 0.1 g fat, 5.7 g carbohydrate and 1.0 g protein. In addition, numerous vitamins and minerals like B1, B6, Folate, Copper, Manganese (0.25 mg), Magnesium (14.0 mg), Potassium (230 mg) and about 10 per cent of daily value of fiber [2].

The brinjal is affected by many plant pathogens. Among them important fungal diseases are damping off (*Pythium* spp.), phomopsis blight (*Phomopsis vexans*), leaf spot (*Cercospora melongenae)*, Alternaria leaf spot (*Alternaria melongenae*), little leaf of brinjal (Phytoplasma) and collar rot (*Sclerotium rolfsii)* [3]. The fungus *Sclerotium rolfsii* is soil-borne saprophytic fungus that causes different types of diseases such as collar rot, Sclerotium wilt, stem rot, charcoal rot, seedling blight, damping off, foot rot, stem blight and root rot in over 500 plants species such as tomato, chilli, sunflower, cucumber, brinjal, soybean, maize, groundnut, bean, watermelon [4]. The symptoms of Sclerotium wilt of brinjal include production of white fan type mycelial mat around the collar region, yellowing and subsequent wilting of the whole plant occurs within 3-5 days and the entire plant will dries up [5]. The disease severity will be more at the early flowering and peak fruiting stage of brinjal and the fungus survive in the soil for years together by producing sclerotial bodies. These sclerotia after germination produce oxalic acid, pectinolytic and cellulolytic enzymes which kill and disintegrate host tissues, starting a new infection and causing the disease in host [6]. *S. rolfsii* has been reported to cause the fruit yield losses up to 30 to 50 per cent [7]. The Sclerotium wilt of brinjal is an important disease and occurs severely in the brinjal growing areas of northern Karnataka. In order to know the occurence of disease and factors contributing for incidence of disease, a study was conducted to gain knowledge about prevalence of sclerotium wilt of Brinjal in northern karnataka districts.

2. MATERIALS AND METHODS

2.1 Survey for the incidence of Sclerotium wilt of brinjal in northern Karnataka

The roving survey was conducted during *rabi* 2020-21 in five brinjal growing districts of northern Karnataka *viz.,* Bagalkot, Belagavi, Dharwad, Gadag and Haveri. Observations on disease incidence were recorded. Total of two to three villages were surveyed in the different taluks. The observation on Sclerotium wilt incidence was taken by counting the total number of plants and the number of plants infected in one meter square quadrend. Further, per cent disease incidence was calculated by using formula given by [8].

$$\text{Per cent disease incidence} = \frac{\text{Number of plants infected}}{\text{Total number of plants observed}} \times 100$$

During survey, information was collected and recorded in the prescribed format given in table 1. And the samples were collected and used for isolation and variability studies. Disease incidence was correlated with soil type, type of irrigation, type of mulch and stage of the crop.

Table 1: Information collected during survey

1.	Village, Taluk, District
2.	Variety/hybrid
3.	Stage of the crop
4.	Type of soil
5.	Type of irrigation
6.	Type of mulch
7.	Per cent disease incidence

2.1.1 Isolation and Idendification of the pathogen from infected sample

The infected plants showing typical symptoms of the disease were used for the isolation of pathogen. The standard tissue isolation procedure was followed to isolate the pathogen. The infected parts were cut into small bits and surface sterilized with 0.1 per cent sodium hypochlorite solution for 60 seconds and washed serially in sterilized distilled water to remove the traces of the chemical if any and then transferred to potato dextrose agar (PDA) slants under aseptic conditions. The slants were incubated at room temperature (27 ± 1°C) for seven days to obtain good fungal growth. The fungus was identified as *Sclerotium rolfsii* based on growth characters and morphology of the fungus as described by [9].

2.1.2 Maintenance of the pure culture

The fungus collected from each location was subcultured on PDA slants and allowed to grow at 28 ± 1°C temperature for one week and later the culture was stored in refrigerator at 4°C for further studies and was sub cultured periodically.

2.1.3 Proving the pathogenicity

Each *Sclerotium rolfsii* pure culture was mixed thoroughly with sterilized soil at the rate of five per cent to get sick soil. Then healthy brinjal seedlings were transplanted in earthen pots filled with sick soil. Seedlings transplanted in pots without inoculum served as control. Observations were taken at regular interval for symptom development. Re-isolation was made from the infected plants in the inoculated pots and compared with that of original culture.

3. RESULTS AND DISCUSSION

3.1 Survey for the incidence of Sclerotium wilt of brinjal in northern Karnataka

The roving survey was carried out in five major brinjal growing districts (Bagalkot, Belagavi, Dharwad, Haveri and Gadag) of northern Karnataka during *rabi* 2020-21 to assess the status of Sclerotium wilt of brinjal under field conditions. In each district various taluks and villages were surveyed and survey results are presented in Table 2 and Fig. 1, 2.

In Bagalkot district, survey was conducted in three taluks. The highest incidence of Sclerotium wilt (15.39%) was recorded in Sonna village of Bilgi taluk followed by Kalhalli village (10.45%) of Jamakhandi taluk of Bagalkot district and no disease incidence was observed in Pettur village of Mudhol taluk in Bagalkot district. In Belagavi district, survey was conducted in four taluks, and the highest incidence of Sclerotium wilt (12.25%) was recorded in Kenganur village of Bailhongal taluk of Belagavi district followed by Bithinkeri village (12.03%) and Dombarkoppa village (10.45%) of Kittur taluk and least incidence of disease was recorded in Yemakanmardi village (3.75%) of Hukkeri taluk and no disease incidence was observed in Hanchinal village of Hukkeri taluk in Belagavi district. In Dharwad district, survey was conducted in two taluks, and the highest incidence of Sclerotium wilt (35.07%) was observed in Narendra village of Dharwad taluk followed by Garag village (15.67%) in Dharwad taluk and the least disease incidence was recorded in Devalingikoppa village (5.23%) of Kalghatgi taluk of Dharwad district. In Gadag district, survey was conducted in total of two taluks, and the highest incidence of Sclerotium wilt was recorded in Kanakikoppa village (9.80%) of Nargund taluk followed by 9.68 per cent in Hosur village of Gadag taluk and the least incidence of Sclerotium wilt (3.65%) was observed in Kurlageri village of Nargund taluk of Gadag district. In Haveri district, survey was conducted in three taluks, and the highest incidence of Sclerotium wilt of 17.71 per cent was observed in Nulageri village of Hirekerur taluk followed by Guddadahosalli village (12.37%) and Kakol village (11.37%) of Ranebennur taluk and the least disease incidence of 5.32 per cent was observed in Basarihalli village of Hirekerur taluk of Haveri district.

Among the different districts surveyed during *rabi* 2020-21, the highest mean disease incidence of Sclerotium wilt of brinjal (12.39%) was recorded in Dharwad district followed by Haveri district (9.03%), Gadag (7.93%) and Belagavi district (7.80%) and the least incidence (6.89%) was recorded in Bagalkot district. The mean disease incidence of all five districts was 8.80 per cent. Mainly, agronomic practises are associated with this trend in wilt disease occurrence. Fields with flooded irrigation and no mulching were found to have a high frequency of diseases. In those fields where mulching and drip irrigation were used, there was little evidence of wilt. The absence of mulching and flood irrigation aids in the dissemination of disease inoculum throughout the field.

Table 2: Incidence of Sclerotium wilt of brinjal during *rabi* 2020-21 in northern parts of Karnataka

District	Taluk	Village	Soil type	Type of irrigation	Variety/hybrid	Type of mulch	Stage of thecrop	Per cent disease incidence
Bagalkot	Bilgi	Dhavaleshwar	Black	Drip	Manjari	Polythene mulch	Flowering	4.81
		Sonna	Black	Flooding	Manjari	No mulch	Fruiting	15.39
		Kontikal	Black	Flooding	Manjari	No mulch	Fruiting	6.65
		Badagandi	Red	Flooding	Manjari	No mulch	Fruiting	7.37
		Mannikeri	Black	Drip	Mahyco 10	Polythene mulch	Fruiting	2.75
		Mean						**7.39**
	Jamakhandi	Kadapatti	Black	Flooding	Dhruva	No mulch	Fruiting	8.21
		Ramateerth	Red	Flooding	Manjari	No mulch	Fruiting	6.00
		Madhurakhandi	Black	Drip	MAHY 11	Polythene mulch	Vegetative	5.21
		Kalhalli	Black	Flooding	Manjari	No mulch	Flowering	10.45
		Mean						**7.41**
	Mudhol	Heballi	Black	Drip	Mahyco 10	Polythene mulch	Fruiting	2.74
		Lokapur	Black	Drip	Manjari	No mulch	Fruiting	10.25
		Ningapur	Black	Flooding	KEPH-218	No mulch	Flowering	8.91
		Pettur	Black	Drip	Mahyco 10	Polythene mulch	Fruiting	**0.0**
		Mudhapur	Black	Flooding	Manjari	No mulch	Flowering	7.38
		Mean						**5.89**
	District mean							**6.89**

Contd……

District	Taluk	Village	Soil type	Type of irrigation	Variety/hybrid	Type of mulch	Stage of thecrop	Per cent disease incidence
Belagavi	Bailhongal	Jalikoppa	Black	Flooding	Dhruva	No mulch	Fruiting	9.63
		Inchal	Black	Flooding	Mahyco	No mulch	Fruiting	7.25
		Belawadi	Red	Drip	Dhruva	Polythene mulch	Flowering	5.65
		Kenganur	Black	Drip	Dhruva	No mulch	Fruiting	12.25
		Nesargi	Black	Flooding	Manjari	No mulch	Fruiting	7.25
		Mean						**8.40**
	Hukkeri	Hanchinal	Red	Drip	Ankur-1039	Polythene mulch	Fruiting	**0.0**
		Yemakanmardi	Red	Flooding	Manjari	No mulch	Flowering	3.75
		Goudawad	Black	Flooding	Dhruva	No mulch	Fruiting	10.38
		Kurani	Red	Drip	Manjari	Polythene mulch	Vegetative	5.65
		Madihalli	Black	Flooding	Dhruva	No mulch	Fruiting	9.36
		Mean						**5.84**
	Gokak	Nagnur	Black	Drip	Ankur-1039	No mulch	Fruiting	7.55
		Gataprabha	Black	Flooding	Manjari	No mulch	Fruiting	9.32
		Thukanatti	Red	Flooding	Manjari	No mulch	Flowering	8.60
		Rajpur	Black	Drip	Mahyco	Polythene mulch	Fruiting	4.79
		Mean						**7.56**
	Kittur	Bassapur	Black	Flooding	Manjari	No mulch	Fruiting	9.86
		Bithinkeri	Red	Drip	Dhruva	No mulch	Fruiting	12.03
		Ambadagatti	Black	Flooding	Manjari	No mulch	Vegetative	7.89
		Yamminakatti	Red	Drip	Manjari	Polythene mulch	Fruiting	6.99
		Dombarkoppa	Black	Flooding	Dhruva	No mulch	Fruiting	10.45
		Mean						**9.43**
	District mean							**7.80**

Contd……

District	Taluk	Village	Soil type	Type of irrigation	Variety/hybrid	Type of mulch	Stage of thecrop	Per cent disease incidence
Dharwad	Dharwad	Narendra	Red	Flooding	Dhruva	No mulch	Fruiting	**35.07**
		Garag	Red	Flooding	Dhruva	No mulch	Flowering	15.67
		Amminabhavi	Black	Drip	Manjari	No mulch	Fruiting	12.06
		Karadigudda	Black	Flooding	Mahyco	No mulch	Flowering	7.63
		Mammigatti	Red	Drip	Dhruva	No mulch	Fruiting	9.75
		Mean						**16.03**
	Kalghatgi	Hirehonnehalli	Black	Flooding	Malapur	No mulch	Fruiting	6.25
		Muttagi	Black	Flooding	Manjari	No mulch	Fruiting	15.36
		Dhummawad	Black	Drip	Manjari	No mulch	Flowering	8.22
		Devalingikoppa	Black	Flooding	Dhruva	No mulch	Vegetative	5.23
		Mean						**8.76**
	District mean							**12.39**
Gadag	Nargund	Dandapur	Red	Flooding	Manjari	No mulch	Fruiting	8.82
		Kalakeri	Black	Flooding	Supriya-10	No mulch	Fruiting	7.77
		Muganur	Red	Drip	Manjari	No mulch	Vegetative	9.34
		Kurlageri	Red	Drip	MAHY-10	Polythene mulch	Fruiting	3.65
		Kanakikoppa	Black	Flooding	Manjari	No mulch	Fruiting	9.80
		Mean						**7.87**
	Gadag	Hosur	Red	Drip	Dhruva	No mulch	Fruiting	9.68
		Neeralagi	Black	Flooding	Supriya-10	No mulch	Flowering	7.51
		Hulkoti	Red	Flooding	Manjari	No mulch	Fruiting	9.37
		Dunduru	Black	Flooding	Manjari	No mulch	Fruiting	5.41
		Mean						**7.99**
	District mean							**7.93**

Contd….

District	Taluk	Village	Soil type	Type of irrigation	Variety/hybrid	Type of mulch	Stage of thecrop	Per cent disease incidence
Haveri	Byadgi	Kadaramundalagi	Red	Flooding	Manjari	No mulch	Fruiting	5.55
		Bisilahalli	Red	Flooding	Dhruva	No mulch	Fruiting	8.74
		Motebennur	Black	Flooding	Dhruva	No mulch	Vegetative	6.32
		Gummanahalli	Black	Flooding	Dhruva	No mulch	Fruiting	7.66
		Mean						**7.06**
	Ranebennur	Guddadahosalli	Red	Flooding	Dhruva	No mulch	Fruiting	12.37
		Kajjari	Black	Flooding	Kalpataru-10	No mulch	Fruiting	8.99
		Kakol	Red	Flooding	Manjari	No mulch	Fruiting	11.37
		Belur	Red	Drip	Dhruva	Polythene mulch	Fruiting	8.81
		Hulihalli	Red	Flooding	Mahyco	No mulch	Fruiting	6.85
		Mean						**9.67**
	Hirekerur	Nulageri	Red	Flooding	Dhruva	No mulch	Fruiting	17.71
		Dhupadahalli	Black	Flooding	Dhruva	No mulch	Flowering	10.35
		Basarihalli	Red	Drip	Manjari	Polythene mulch	Fruiting	5.32
		Kalagonda	Red	Flooding	Ankur	No mulch	Fruiting	9.88
		Hallur	Black	Flooding	Dhruva	No mulch	Fruiting	8.66
		Mean						**10.38**
	District mean							**9.03**
	GRAND MEAN							**8.80**

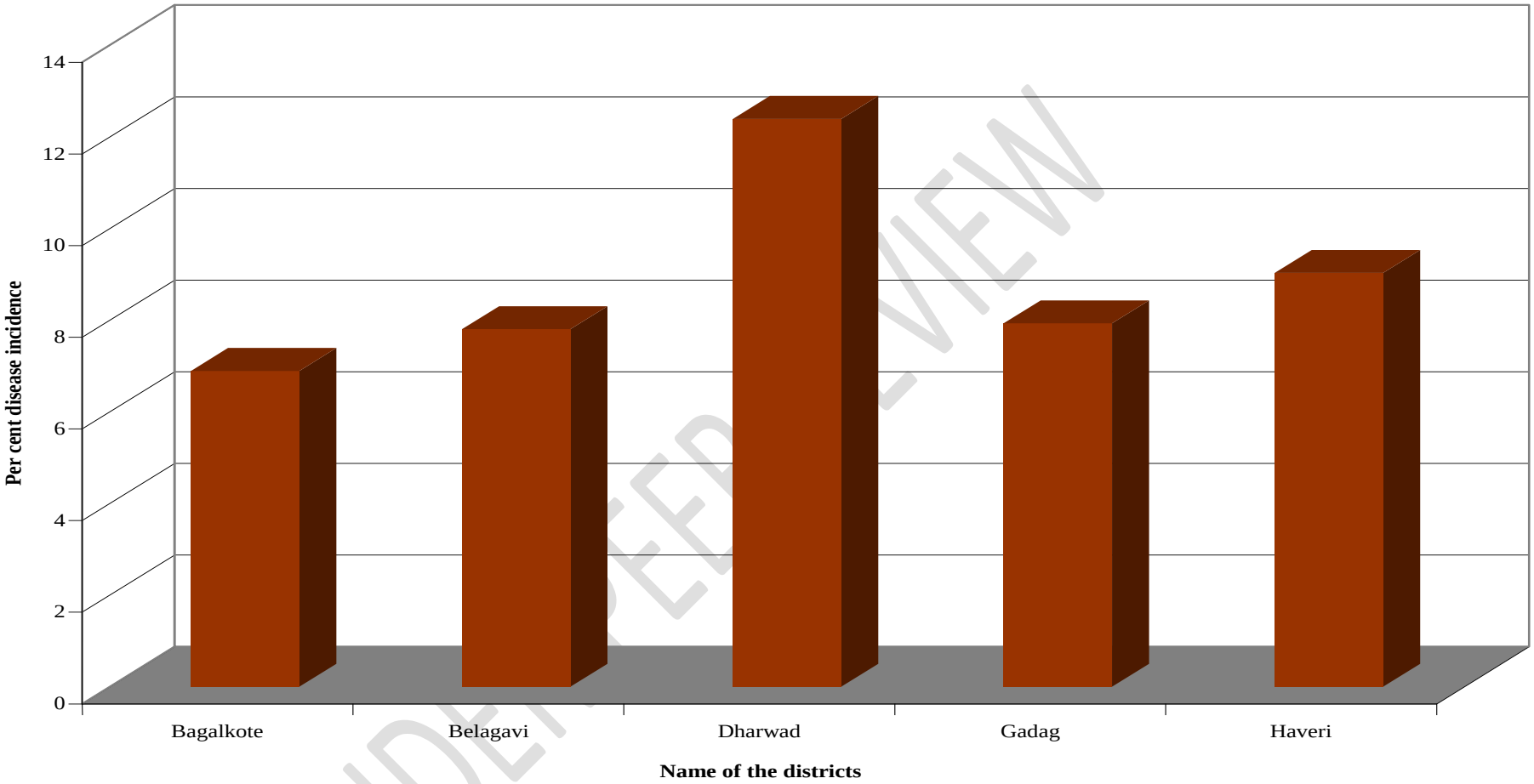

Fig 1: Incidence of Scleortium wilt of brinjal in different districts

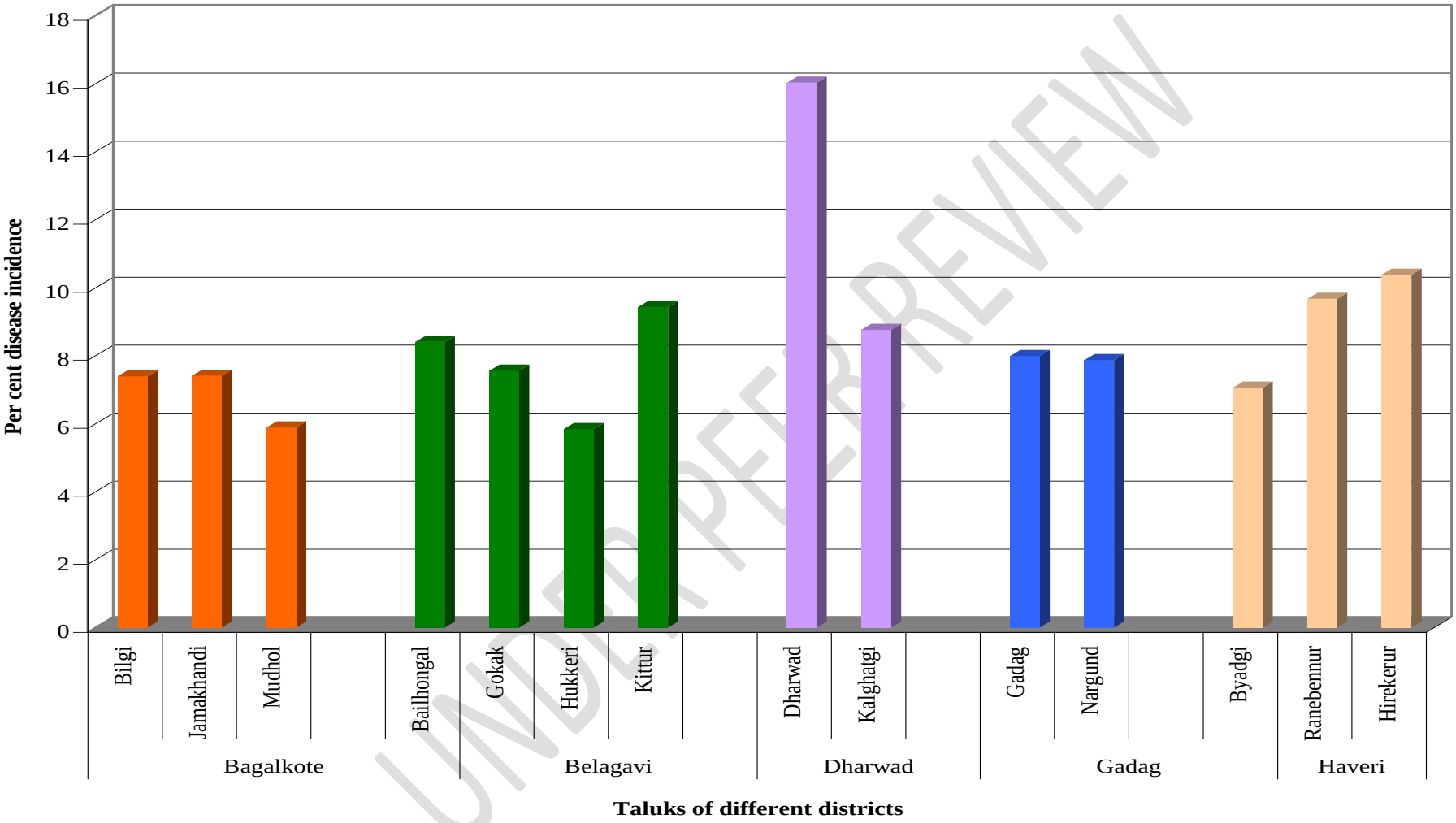

Fig 2: Incidence of Scleortium wilt of brinjal in different taluks

The incidence of Sclerotium wilt varied from 0 to 35.07 per cent in the surveyed districts. Among the different taluks surveyed, mean maximum incidence of disease was observed in Dharwad taluk (16.03%) of Dharwad district followed by Hirekerur (10.38%) and Ranebennur (9.67%) taluks of Haveri district. Least incidence of disease was recorded in Hukkeri taluk (5.84%) of Belagavi district given in the table 3. Among the different villages surveyed, maximum disease incidence was noticed in Narendra village (35.07%) of Dharwad taluk followed by Nulageri village (17.71%) of Hirekerur taluk and Garag village (15.67%) of Dharwad taluk. No disease incidence was recorded in Hanchinal village of Hukkeri taluk and Pettur village of Mudhol taluk. Mean per cent incidence of Sclerotium wilt of brinjal at different taluks and districts during rabi 2020-21 is given in table 3.

Table 3: Mean per cent incidence of Sclerotium wilt of brinjal at different taluks and districts during *rabi* 2020-21

Sl. No.	District	Taluk	Mean per cent disease incidence
1	Bagalkot	Bilgi	7.39
		Jamakhandi	7.41
		Mudhol	5.89
		Mean	6.89
2	Belagavi	Bailhongal	8.40
		Gokak	7.56
		Hukkeri	5.84
		Kittur	9.43
		Mean	7.80
3	Dharwad	Dharwad	16.03
		Kalghatgi	8.76
		Mean	12.39
4	Gadag	Gadag	7.99
		Nargund	7.87
		Mean	7.93
5	Haveri	Byadgi	7.06
		Ranebennur	9.67
		Hirekerur	10.38
		Mean	9.03

Incidence of Sclerotium wilt of brinjal in different soil type, irrigation, mulch and stage of the crop during rabi 2020-21 is given in the table 4. The maximum mean PDI (9.75%) was observed in the red soil compared to the black soil (8.31%). Crop irrigated with drip system recorded the least per cent disease incidence of 6.83 per cent compared to flood irrigation (9.58%). And crop grown under polythene mulch has recorded the least mean PDI (4.33%) than in the crop grown without mulch (9.68%), as the mulching increases the soil temperature and imparting a soil solarization effect and limiting the sclerotial germination activity. In relation to stage of the crop, fruiting (9.18%) and flowering

(8.22%) stage has shown maximum disease incidence as compared to vegetative stage of the crop (6.40%), this is because when all the nutrients and carbohydrates translocate to the reproductive part leads to imbalance in supply of nutrients and leading to invasion by *S. rolfsii.*

This is in agreement with variable incidence of *S. rolfsii* **at different localities of Dharwad, Gadag, Haveri and Belagavi districts, out of which highest disease incidence was recorded in Belagavi district and 8.89 per cent disease incidence of Sclerotium wilt of brinjal in black soil [10]. A similar survey conducted in Dharwad, Gadag, and Belagavi districts of northern Karnataka to assess the incidence of Sclerotium rolfsii-induced wheat foot rot, with Mangalagatti village having the highest incidence at 4.17% [11]. A survey performed during kharif 2012 to determine the incidence of stem rot of sunflower caused by** *S. rolfsii,* **and they discovered that Dindugal district had the highest incidence of stem rot (5.5%), followed by Erode district (5%). The Tuticorin district had the lowest prevalence [12].**

Table 4: Incidence of Sclerotium wilt of brinjal in different soil type, irrigation, mulch andstage of the crop during *rabi* 2020-21

Mean	Soil type		Type of irrigation		Type of mulch		Stage of the crop		
	Red	Black	Flooding	Drip	No mulch	Polythene mulch	Vegetative	Flowering	Fruiting
Per cent Disease Incidence(PDI)	9.75	8.31	9.58	6.83	9.68	4.33	6.40	8.22	9.18

a) Mycelial mat on collar region

b) Mycelial mat on root

c) Mycelia and sclerotial bodies on stem

d) Sclerotial bodies on soil

e) Wilted plant

Fig 3: Symptoms of Sclerotium wilt of Brinjal

3.1.1 Symptoms of the disease

The symptoms of Sclerotium wilt of brinjal caused by *Sclerotium rolfsii* mainly includes production of white radiating type mycelial mat around the collar region and roots, on such collar region creamy coloured spherical to round shaped sclerotial bodies were produced later yellowing and subsequent wilting of the whole plant. Such wilted plants were easily pulled out from the soil. Typical symptoms of sclerotium wilt of Brinjal is given in the figure 3.

3.1.2 Isolation and identification of the pathogen

Isolation of the pathogen collected from each location was done from stem and roots showing typical symptoms of the disease. The pathogen was isolated using tissue segment method on potato dextrose agar (PDA) medium. Further the fungus was purified by hyphal tip method and maintained on PDA. The mycelium of the fungus was first silky whitish in colour, later turned in to dull white, with radial spreading giving a fanlike appearance. The thin, aerial hyaline septate hyphae with profusely branched mycelium was found by microscopic examination of fungal mycelium. Small mycelial knots emerged at maturity in the culture, which later became whitish sclerotial bodies, then changed into dark brown to tan-coloured mustard seeds, rough, shiny and spherical to irregular in shape. The pathogen was identified on the basis of those characters as Sclerotium rolfsii Sacc. The colony and morphological characters of mycelium and sclerotia were in consistent with previous studies [9]. Thus, the fungus was described as Sclerotium rolfsii Sacc. under the present investigation which is depected in the figure

These were similar to the earlier reports on brinjal and sugar beet crop respectively [10, 13].

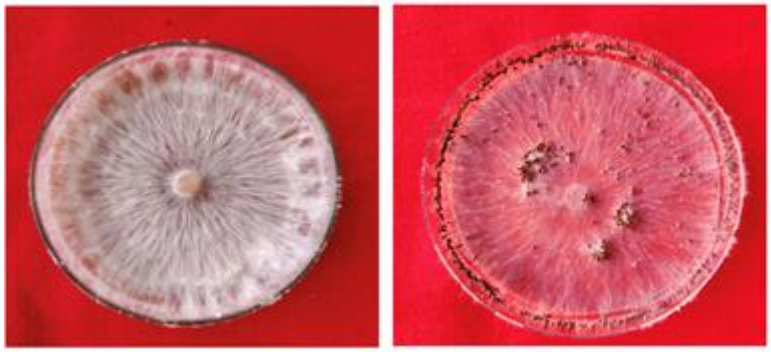

Fig 4: Pure culture of *Sclerotium rolfii* Sacc.

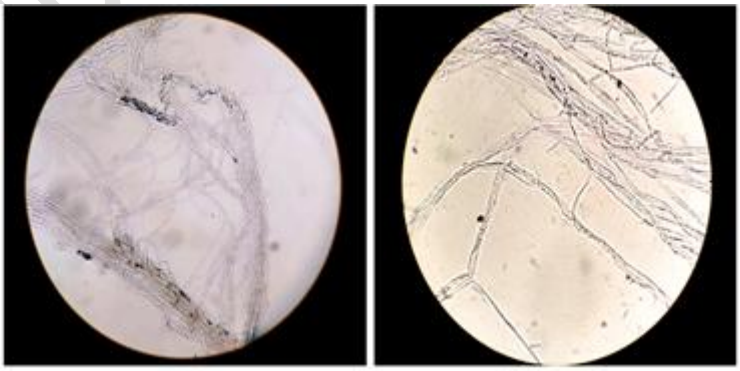

Fig 5: Microphotograph of *Sclerotium rolfii* Sacc. showing septate and branched mycelium

3.1.3 Pathogenicity test

Soil inoculation method was followed to prove the pathogenicity of *S. rolfsii* on brinjal. Plants were observed for typical disease development. The results revealed that initially there was a white coloured radiating mycelial growth at collar region, later the whole plant get wilted. Numerous white-brown round sclerotia resembling mustard seeds were observed near the collar region. The pathogen was re-isolated from such plants and morphological character of re-isolated pathogen was compared with the original culture of the pathogen which was similar to that of original culture. Hence, causal agent of the disease was confirmed as *Sclerotium rolfsii* Sacc. The pathogenecity of Sclerotium rolfii on brinjal plant is depicted in Fig. 6.

Several workers found soil inoculation method as most suitable in establishing the disease caused by *S. rolfsii* in potato[14]; in brinjal [15]; in sugarbeet [13].

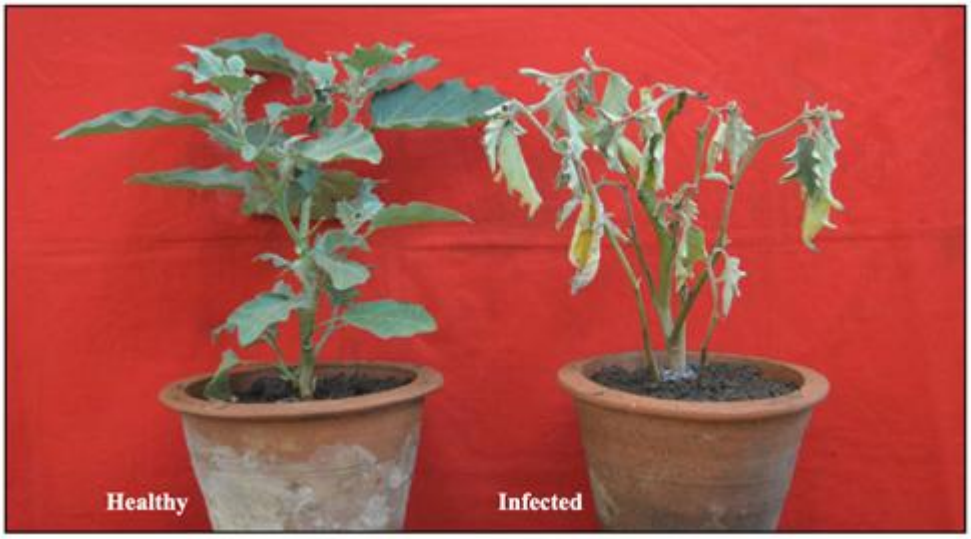

Fig 6: Pathogenecity of *Sclerotium rolfii* on brinjal plant

4. CONCLUSION

A study on the prevalence of sclerotium wilt of brinjal discovered that edaphic factors and agronomic practises are associated to disease incidence. The study found that agronomic practices, particularly flooded irrigation and lack of mulching, contribute to a high incidence of wilt disease in all five districts. Fields with mulching and drip irrigation showed minimal wilt, while those without mulching and flood irrigation spread disease inoculum throughout the field. Mulching enhances soil temperature, promotes soil solarization, and restricts sclerotial germination activity. The fruiting and flowering stages of a crop show the highest disease incidence due to an imbalance in nutrient supply and invasion by *S. rolfsii,* as nutrients and carbohydrates are transferred to the reproductive part. These findings advocate for the development of integrated management strategies to lessen the issue of brinjal sclerotium wilt.

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