



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; SP-12(10): 549-551
© 2023 TPI

www.thepharmajournal.com

Received: 14-08-2023

Accepted: 17-09-2023

Deepa G

Ph.D. Scholar, Department of Plant Pathology, University of Agricultural Sciences, Dharwad, Karnataka, India

Shripad HK

Professor and Head of Institute of Organic Farming, Department of Plant Pathology, University of Agricultural Sciences, Dharwad, Karnataka, India.

Patil PV

Professor and University Head, Department of Plant Pathology, University of Agricultural Sciences, Dharwad, Karnataka, India

Patil CR

Professor and Head, Department of Microbiology, University of Agricultural Sciences, Dharwad, Karnataka, India

Biradar MS

Professor and Head of KVK, Department of Horticulture, University of Agricultural Sciences, Dharwad, Karnataka, India

Corresponding Author:

Deepa G

Ph.D. Scholar, Department of Plant Pathology, University of Agricultural Sciences, Dharwad, Karnataka, India

Survey for incidence of Fusarium wilt in major tomato growing areas of northern Karnataka

Deepa G, Shripad HK, Patil PV, Patil CR and Biradar MS

Abstract

Tomato (*Solanum lycopersicum* L.) also known as the poor man's orange, is a widely cultivated vegetable belonging to the *Solanaceae* family. Tomatoes are rich in vitamins A, B, C and provide a diverse range of colours and flavours to dishes. Recently, their medicinal value has gained recognition due to the antioxidant properties of ascorbic acid and the presence of lycopene. However, tomatoes are susceptible to various diseases caused by fungi, bacteria, viruses and nematodes. One of the major challenge is Fusarium wilt, caused by the soil-borne fungus *Fusarium oxysporum* f. sp. *lycopersici*, which significantly affects tomato yield. To assess the extent of this disease, a survey was conducted in six districts of northern Karnataka namely Dharwad, Vijaypur, Bagalkote, Belagavi, Haveri and Gadag. The survey findings revealed that wilt disease incidence was prevalent throughout the surveyed districts where tomato cultivation was practiced. The range of wilt incidence varied from 3.85 percent to 23.81 percent. Dharwad district exhibited the highest wilt incidence of 17.76 percent, while Bagalkote district had the lowest incidence of 9.84 percent. These results highlight the widespread occurrence of Fusarium wilt and highlight the need for effective management strategies in tomato cultivation in northern Karnataka.

Keywords: Tomato, Fusarium wilt, northern Karnataka and *Fusarium oxysporum* f. sp. *lycopersici*

Introduction

Tomato (*Solanum lycopersicum* L.) is a widely cultivated and highly consumed vegetable crop worldwide (Pastor *et al.*, 2012) ^[10]. Belonging to the *Solanaceae* family, it holds significant importance as the second most important vegetable crop after potato (Gondal *et al.*, 2012) ^[4]. Tomato plants exhibit adaptability to various climatic zones, thriving in relatively cool and dry environments. Currently, global tomato production stands at approximately 177.12 million tons with China leading in both cultivation area (1 million ha) and production (56.42 million tons). India holds the second position, producing 18.39 million tons, while the United States, Turkey and Egypt also contribute significantly to tomato production. In Karnataka, the crop is grown over an area 0.079 mha and production 2.51 mt of fruits with an productivity 32 mt/ha (Anon., 2022) ^[1].

Tomato plants are affected by a range of diseases caused by different agents, including bacteria, viruses, nematodes, fungi, and abiotic factors (Sahu *et al.*, 2013) ^[12]. Among the fungal diseases, Fusarium wilt, a fungal disease caused by *Fusarium oxysporum* f. sp. *lycopersici*, poses a significant threat to tomato plants worldwide resulting in substantial economic losses in tomato production. This particular fungus is a soil borne pathogen that can persist in the soil for approximately 8-10 years in the form of chlamydospores which serve as resting structures (Prachi *et al.*, 2019) ^[11]. *Fusarium oxysporum* f. sp. *lycopersici* exerts considerable pressure on crop yields leading to production losses ranging from 30 to 40 percent. In some cases if favourable climatic conditions promote fungal growth these losses may even escalate to 80 percent (Nirmaladevi, 2016) ^[9]

Materials and Methods

During the *rabi* season of 2021 and 2022 a roving survey was conducted in key tomato growing regions of northern Karnataka viz., Dharwad, Vijaypur, Bagalkote, Belagavi, Haveri and Gadag districts. The primary objective of this survey was to evaluate the extent of Fusarium wilt disease incidence in tomato growing areas. To accomplish this, samples were gathered from tomato fields. By employing a specific formula the percentage of disease incidence was determined.

$$\text{Percent Disease Incidence} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

Results and Discussion

A roving survey was conducted during *rabi* 2021 and 2022 to record the incidence of Fusarium wilt of tomato in major tomato growing regions of northern Karnataka *viz.*, Dharwad, Vijaypur, Bagalkote, Belagavi, Haveri and Gadag districts. The data was revealed that the disease was widespread in all the surveyed areas.

The disease incidence of Fusarium wilt of tomato ranged between 3.85 percent and 23.81 percent in the different districts of northern Karnataka where survey was done. With respect to survey the highest percent disease incidence was observed in Garag (23.81%) village of Dharwad district whereas, in Kurlageri village of Gadag district (Table1) recorded least disease incidence of 3.85 percent during both the surveyed year.

Pooled surveyed data indicates that highest mean percent disease incidence of Fusarium wilt of tomato was recorded in Dharwad district (17.76%) followed by Haveri district with the incidence of 15.61 percent and Vijaypur district with the incidence of 14.01 percent. Belagavi district recorded the incidence of 13.17 percent whereas, Gadag district had the incidence of the disease up to 10.49 percent. Least mean percent disease incidence of Fusarium wilt of tomato was reported in Bagalkote district of (09.84%) (Table 1).

Taluka wise survey analysis during *rabi* 2021 indicates the highest taluka mean disease incidence in Dharwad (21.71%) followed by Muddebihal (16.64%), Hubli (16.31%), Savanoor (14.31%), Ranebennur (13.96%), Gadag (13.04%), Belagavi (12.86%), Gokak (11.01%), Basavan bagewadi (10.94%), Bilgi (10.17%), Bagalkote (07.45%) and least percent disease incidence was noticed in Nargund taluk (06.68%).

According to the survey results during *rabi* 2022, maximum taluka mean disease incidence was noticed in Dharwad (18.72%) followed by Savanoor (17.56%), Muddebihal (16.67%), Ranebennur (16.59%), Belagavi (14.95%), Bilgi (14.84%), Hubli (14.29%), Gokak (13.87%), Nargund (12.70%), Basavan bagewadi (11.78%) and Gadag taluka (09.52%). Least percent disease incidence was noticed in Bagalkote taluka (06.82%). The data indicates that there was a difference in disease occurrence with respect to locations and which might be due to the presence of congenial weather conditions and also because of the continuous monocropping where the disease incidence was maximum.

The results of the current study indicated that wilt occurrence was observed across all the surveyed districts. However, the incidence of wilt varied among different villages and fields. This variability could be attributed to factors such as soil type, variety cultivated, previous crop, moisture levels in the field and the adopted management practices.

The findings of the present study align with Devi *et al.* (2021) [3] who investigated the prevalence of Fusarium wilt disease in tomato crops across three districts in Andhra Pradesh: East Godavari, West Godavari, and Krishna. These researchers conducted a survey in 27 fields and found that the incidence of Fusarium wilt disease varied between 7.48 percent and 29 percent showing consistent results across the surveyed districts. According to Madhavi *et al.* (2006) [7] Fusarium wilt disease was observed in nearly every tomato growing region of Andhra Pradesh with an incidence of up to 30 percent.

According to Jayanta *et al.* (2018) [5] the incidence of wilt

disease varied from 8.33 to 38.66 percent in the districts of Kalaburgi and Raichur respectively with a maximum incidence of 26.21 and 21.25 percent. According to Khan *et al.* (2017) [6] who documented the incidence of Fusarium wilt disease in tomatoes was up to 80.34 percent in Masauli block (Barabanki district) and 74.50 percent in Arniya block (Bulandshahr district). The overall disease incidence in all Uttar Pradesh districts surveyed ranged from 10.67 to 80.34 percent.

The study by Mamatha *et al.* (2013) [13] found that the incidence of tomato disease caused by Fusarium wilt varied from 0 to 78.70 percent in Uttar Pradesh. Manikandan and Raguchander (2014) [8] reported similar results by stating that wilt disease varied in incidence from 19 to 45 percent in almost all tomato growing regions of Tamil Nadu State. Similar conclusions were drawn by Bharat *et al.* (2014) [2] who noticed that the intensity of the disease was influenced by variations in the pathogen within a region and that the incidence of wilt disease varied by region.

Table 1: District and taluka wise mean percent disease incidence of Fusarium wilt of tomato

Districts	Taluka	Percent Disease Incidence		Mean
		2021	2022	
Dharwad	Dharwad	21.71	18.72	20.21
	Hubli	16.31	14.29	15.30
	District mean	19.01	16.50	17.76
Vijayapur	Basavan bagewadi	10.94	11.78	11.36
	Muddebihal	16.64	16.67	16.65
	District mean	13.79	14.23	14.01
Bagalkot	Bilgi	10.17	14.84	12.50
	Bagalkote	07.54	06.82	07.18
	District mean	08.85	10.83	09.84
Belagavi	Belagavi	12.86	14.95	13.91
	Gokak	11.01	13.87	12.44
	District mean	11.94	14.41	13.17
Haveri	Ranebennur	13.96	16.59	15.28
	Savanoor	14.31	17.56	15.94
	District mean	14.14	17.07	15.61
Gadag	Gadag	13.04	09.52	11.28
	Nargund	06.68	12.70	09.69
	District mean	09.86	11.11	10.49

Conclusion

Tomato Fusarium wilt was found in all the surveyed locations of northern Karnataka. Among the districts surveyed, Dharwad district recorded highest mean percent disease incidence and which was followed by Haveri district and the least mean percent disease incidence of Fusarium wilt of tomato was reported in Bagalkote district.

Reference

1. Anonymous. Area, production and productivity of tomato; c2022, www.indiastatagri.com.
2. Bharat NK, Thakur M, Bhardwaj RK, Kumar S. Occurrence of Sclerotinia rot and Botrytis gray mould on lettuce under protected conditions in Himachal Pradesh. International Journal of Farm Sciences. 2014;4(2):86-91.
3. Devi GN, Deepika SD, Sowmya LK. Survey for Fusarium wilt disease incidence of tomato in Andhra Pradesh state. International Journal of Botany Studies. 2021;6(6):1083-1091.
4. Gondal AS, Ijaz M, Riaz K, Khan A. Effect of different doses of fungicide (Mancozeb) against Alternaria leaf

- blight of Tomato in Tunnel. Journal of plant pathology and microbiology. 2012;3(3):1-3.
5. Jayanta IN, Mallesh SB, Zaheer AB, Amaresh YA, Sreedevi SC, Ramesh G. Survey for the incidence of Fusarium wilt and root knot nematode complex of tomato in North Eastern Karnataka, India. International Journal of Current Microbiology and Applied Sciences. 2018;7(9):2060-2066.
 6. Khan N, Maymon M, Hirsch AM. Combating Fusarium infection using *Bacillus*-based antimicrobials. Microorganisms. 2017;5:75.
 7. Madhavi M, Kumar CP, Reddy DR, Singht T. Integrated Management of Wilt of Chilli Incited by. Indian Journal of Plant Protection. 2006;34(2):225-228.
 8. Manikandan R, Raguchander T. *Fusarium oxysporum* f. sp. *lycopersici* retardation through induction of defensive response in tomato plants using a liquid formulation of *Pseudomonas fluorescens* (Pf1). European journal of plant pathology. 2014;140(3):469-480.
 9. Nirmaladevi D, Venkataramana M, Rakesh SK, Uppalapati SR, Vijai KG, Yli-Mattila T, *et al.* Molecular phylogeny, pathogenicity and toxigenicity of *Fusarium oxysporum* f. sp. *lycopersici*. Scientific Reports. 2016;6:21367.
 10. Pastor N, Carlier E, Andres J, Rosas SB, Rovera M. Characterization of rhizosphere bacteria for control of phytopathogenic fungi of tomato. Journal of Environmental Management. 2012;95:332-337.
 11. Prachi S, Singh HB, Jyoti S, Rahul SR, Anukool V, Shatrupa R, *et al.* Exploration of multitrait antagonistic microbes against *Fusarium oxysporum* f. sp. *lycopersici*. Journal of Applied and Natural Science. 2019;1(2):503-510.
 12. Sahu DK, Khare CP, Singh HK, Thakur MP. Evaluation of newer fungicide for management of early blight of tomato in Chhattisgarh. The Bioscan. 2013;8(4):1255-1259.
 13. Krishnamoorthy B, Mamatha NS, Kumar VA. TMJ imaging by CBCT: Current scenario. Annals of maxillofacial surgery. 2013 Jan;3(1):80-83.