Exploring Chili Anthracnose in Uttar Pradesh's Key Cultivation Regions"

ABSTRACT

Chilli, a significant spice and vegetable crop in India, faces susceptibility to various fungal diseases, including Anthracnose, Damping-off, Fusarium wilt, collar rot, dry root rot, and stem rot. Among these, Anthracnose and Fusarium wilt stand out as the most widespread and impactful. This study presents a comprehensive analysis of anthracnose disease incidence across 20 selected locations in major chili cultivation regions of Uttar Pradesh, spanning two years (2020-21 and 2021-22). By conducting district-wise and village-wise assessments, the prevalence of infections was assessed. The findings showcase distinct disease incidence percentages across locations. Pooled data analysis revealed the highest average anthracnose disease incidence in Rajatalab, Varanasi (60.71%), followed by Kumarganj village, Ayodhya district (60.36%). Conversely, the lowest average incidence was recorded in Sangapur village, Amethi (37.88%). followed by Sonari village, Amethi(38.36%). This study provides valuable insights into the dynamic nature of anthracnose infections in chili cultivation areas, to formulate the integrated disease management strategy

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KEYWORDS: Chilli, Survey,Anthracnose,UttarPradesh,Pooled data (No need)

INTRODUCTION

Among the Solanaceous plants growing in India,thechilli (*Capsicum annuum* L.) is particularly significant due to its high nutritional content and variety of uses. The yield of chilli in the nation is still very depressing when compared to its productivity in developed countries, despite the evaluation in enhanced varieties and usage of the recommended package of practises. There are a number of key restrictions for pests, diseases, and low productivity. Diseases brought onMajor diseases caused by bacteria, viruses, and funguses are serious and affect both productivity and quality.

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Anthracnose, caused by *Colletotrichum capsici*, and wilt, caused by *Fusarium oxysporum* f. sp. *capsici*, istwo fungal diseases that are increasingly posing a serious danger to the production of chillies.From Coimbatore in the Madras Presidency, **Sydow (1928)**was the first to report the anthracnose in India. Various workers have reported yield losses of up to 50% in Thailand, 21% to 47% in Sri Lanka, 15% in Korea, and 50% in Malaysia **(Than et al., 2008).**

When researching *Colletotrichum frutescens*, Linn., **Bansal and Grover (1969)** found that anthracnose caused 10 to 35% fruit loss in 1966 and 20 to 60% fruit loss in 1967 in six districts of Punjab and Haryana. Fruit loss up to 66–84 percent was found in Northern Karnataka by **Thind and Jhooty(1985)**. Keepinginviewtheimportanceofchill,thispresentsurveywasaimedtoinvestigatetheincidenceofanthracnosecropsoastoprovideinformationregardingintegrateddiseasemanagementtoserveasanalternativeguideforthedecisionmaking of thefarmers.

Materials and Methods

Surveyand collectionofdiseasesample

AnextensivefieldsurveywasconductedfrommajorchilligrowingareasofUttarPradeshduring the year (2020-21 and 2021-22). in ten districts of Uttar Pradesh viz., Sultanpur, Pratapgarh, Amethi, Faizabad, Etawah, Kanpur, Jaunpur, Prayagraj, Deoria, and Varanasi.Atotal 20 plant sampleswas collected from different districts of Uttar Pradesh for anthracnose pathogen. Plant sample was collected from infected chilli plant and fruits. Sample was wrapped in old news paper and kept in propylene bags and clearly marked like: sample no, crop, block, district, date of collection etc. and write down the data of survey in survey form and it was brought to the laboratory of Department of Plant pathology, CSAUA&T, Kanpur for further investigation.

Table 1: Nameof locationindifferentdistricts of U.P.surveyed

S.No.	Districts	Locations
1	Sultanpur	Knuwar, Semari
2	Pratapgarh	Basupur, Kohandaur
3	Amethi	Sangapur, Sonari
4	Ayodhya	Milkipur, Kumarganj
5	Etawah	Bamhora, Lakhi

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6	Kanpur	Vegetable farm kalyanpur, Sarsaul
7	Jaunpur	Machalishahar, Kalwan
8	Prayagraj	Naini, Mahewa
9	Deoria	Lar road, Sajaw
10	Varanasi	Ramana, Raja talab

Collection of disease prevalence data in major chilli growing areas in Uttar Pradesh

An extensive survey was conducted in 20 selected locations of Sultanpur, Pratapgarh, Amethi, Faizabad, Etawah, Kanpur, Junpur, Prayagraj, Deoria, and Varanasi districts of Uttar Pradesh during 2021-2022 & 2022-2023 (Table.1 and Fig.1-2).Data were collected from the different sites through the application of participatory research appraisal tools and techniques, such as direct observation, and field visits using a questionnaire. On the basis of field symptoms infected plant samples were collected from the fields of villages adjoining to Block Headquarters of each district. For the calculation of disease incidence in each location, randomly 20 chilli plants were selected and total number of fruits and infected fruits were counted.

The calculation of the mean anthracnose of each location assessed by using following formula:

PDI (Per cent Disease Incidence)$= \frac{\text{NO. of sample infected fruit}}{\text{Total no. of fruit per plant}} \times 100$

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Result and Discussion:

The experimental findings detailed in the Table: 2and Fig 1&2present an analysis of Chilli anthracnose disease incidence across various districts and villages over the span of two years, namely 2021-22 and 2022-23, with the inclusion of pooled data.

District-wise and village-wise examinations of fruit were conducted to determine the prevalence of infections. In the district of Sultanpur, the village of Kunwar exhibited a disease incidence of 42.61% in 2021-22, rising slightly to 42.87% in 2022-23, while Semari showed an increase from

41.58% to 45.73% over the same period. Similarly, in Pratapgarh, Basupur demonstrated an increase in disease incidence from 45.68% to 48.59%, whereas Kohandaur saw an elevation from 39.06% to 41.93%. Moving to Amethi, the village of Sangapur experienced an upswing from 35.66% to 40.10%, whereas Sonari displayed an increase from 36.56% to 40.17%.

In Ayodhya, Milkipur showcased a rise from 53.32% to 56.87%, and Kumarganj recorded an increase from 58.53% to 62.19%. Etawah'sBamhora observed an increase from 55.65% to 58.88%, while Lakhi witnessed an increment from 49.83% to 52.91%. Kanpur's Vegetable Farm exhibited an increase from 44.50% to 47.52%, and Sarsaul displayed an elevation from 52.75% to 55.79%. In Jaunpur, Machalishahar increased from 47.95% to 50.42%, and Kalwan rose from 52.78% to 55.99%. Prayagraj'sNaini saw an increase from 52.38% to 54.94%, while Mahewa displayed an increment from 50.00% to 54.81%. Deoria's Lar Road showed an increase from 53.19% to 56.41%, and Sajaw demonstrated an elevation from 55.95% to 58.57%. Lastly, in Varanasi, Ramana maintained a consistent 55.95% disease incidence in both years, and Raja Talab notably increased from 54.90% to 66.51%. These findings collectively reveal the varying trends in fruit disease incidence across districts and villages during the specified years, underscoring significant fluctuations in infection rates for different fruit types.

Among all 20 selected locations the Maximum anthracnose disease incidence (average) percent was recorded in Rajatalab (Varanasi) (60.71%) followed by 60.36 % Kumarganj village of Ayodhya. Similar results were found by **Mishra et al.,(2018)**from 40.80 to 54.90 in different district of Faizabad.

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Differences in environmental conditions between Ayodhya and Amethi districts may have influenced disease incidence. Climatic variables, such as temperature, humidity, and rainfall, can create conditions conducive to anthracnose development.Research by **Thakur et al., (2019)** emphasizes the role of environmental factors in anthracnose severity. Variations in temperature and humidity can directly impact disease progression. **Anamika et al., (2014)** also conducted survey in five locations of Rewa Province to assess the incidence of anthracnose of chilli and they observed 55.53 to 71.10 percent disease severity under field conditions.Similar results were reported by **Yadav et al., (2016)**

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Conclusion: The district-wise and village-wise examinations conducted to assess the prevalence of anthracnose infections in various chili cultivation areas provide valuable insights into the dynamic nature of disease incidence. The study spanned two years (2021-22 and 2022-23) and revealed varying trends in disease severity across different districts and villages within Uttar Pradesh.Across different locations, there were discernible shifts in anthracnose disease incidence percentages. The findings highlighted both increases and decreases in disease incidence, showcasing the complexity of disease dynamics within the region. The study demonstrated that anthracnose can exhibit fluctuations in infection rates across diverse geographical areas and over different time periods.Overall, this study contributes to our understanding of anthracnose disease dynamics in chili cultivation areas, shedding light on the varying trends in disease incidence across districts and villages. Such insights are crucial for designing targeted disease management strategies that consider local factors, environmental conditions, and host-pathogen interactions. Continuous monitoring and research efforts are essential to adapt and develop effective measures to mitigate the impact of anthracnose on chili cultivation.

Table 2: Disease incidence of *Colletotrichumcapsici*from different locations during 2021-22 and 2022-23

District	Village/ Location	2021-22			2022-23			Pooled data		
		Total number of fruit examine	Total number of fruit infected	Disease incidence (%)	Total number of fruit examine	Total number of fruit infected	Disease incidence (%)	Total number of fruit examine	Total number of fruit infected	Disease incidence (%)
Sultanpur	Kunwar	1021	435	42.61	1024	439	42.87	1022.5	437	42.74
	Semari	1496	622	41.58	1499	626	45.73	1497.5	624	43.65
Pratapgarh	Basupur	1088	497	45.68	1091	501	48.59	1089.5	499	47.14
	Kohandaur	1083	423	39.06	1086	427	41.93	1084.5	425	40.49
Amethi	Sangapur	830	296	35.66	833	300	40.10	831.5	298	37.88
	Sonari	1529	559	36.56	1532	563	40.17	1530.5	561	38.36
Ayodhya	Milkipur	1444	770	53.32	1447	774	56.87	1445.5	772	55.10
	Kumarganj	1360	796	58.53	1363	800	62.19	1361.5	798	60.36
Etawah	Bamhora	911	507	55.65	914	511	58.88	912.5	509	57.27
	Lakhi	1188	592	49.83	1191	596	52.91	1189.5	594	51.37
Kanpur	Vegetable farm, CSAUA&T,	746	332	44.50	749	336	47.52	747.5	334	46.01
	Sarsaul	910	480	52.75	913	484	55.79	911.5	482	54.27
Jaunpur	Machalishahar	757	363	47.95	760	367	50.42	758.5	365	49.19
	Kalwan	648	342	52.78	651	346	55.99	649.5	344	54.38
Prayagraj	Naini	905	474	52.38	908	478	54.94	906.5	476	53.66
	Mahewa	736	368	50.00	739	372	54.81	737.5	370	52.41
Deoria	Lar road	816	434	53.19	819	438	56.41	817.5	436	54.80
	Sajaw	899	503	55.95	902	507	58.57	900.5	505	57.26
Varanasi	Ramana	899	503	55.95	902	507	58.57	900.5	505	57.26
	Raja talab	938	515	54.90	941	519	66.51	939.5	517	60.71

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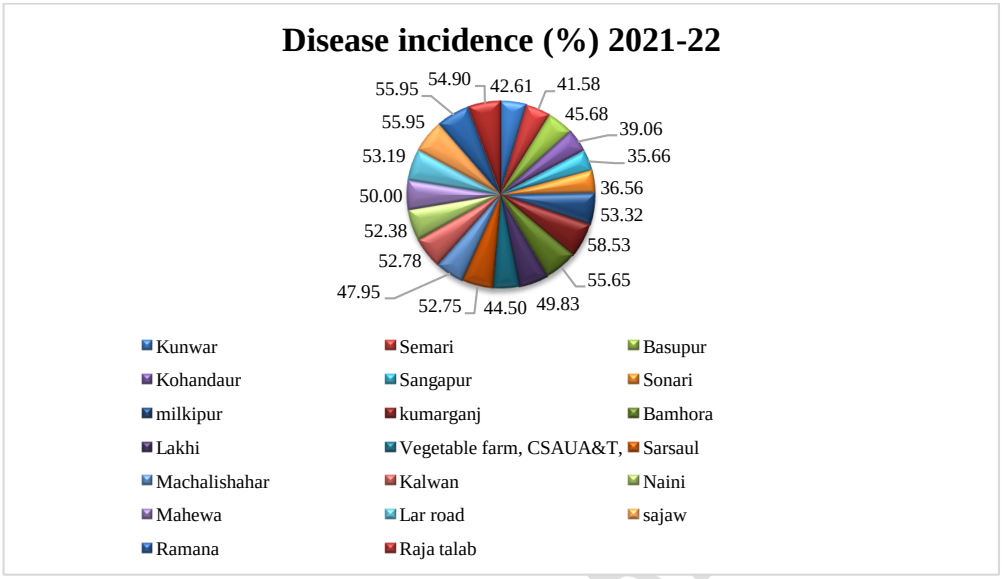

Fig. 1: Disease incidence in villages of different districts of Uttar Pradesh during 2021-2022

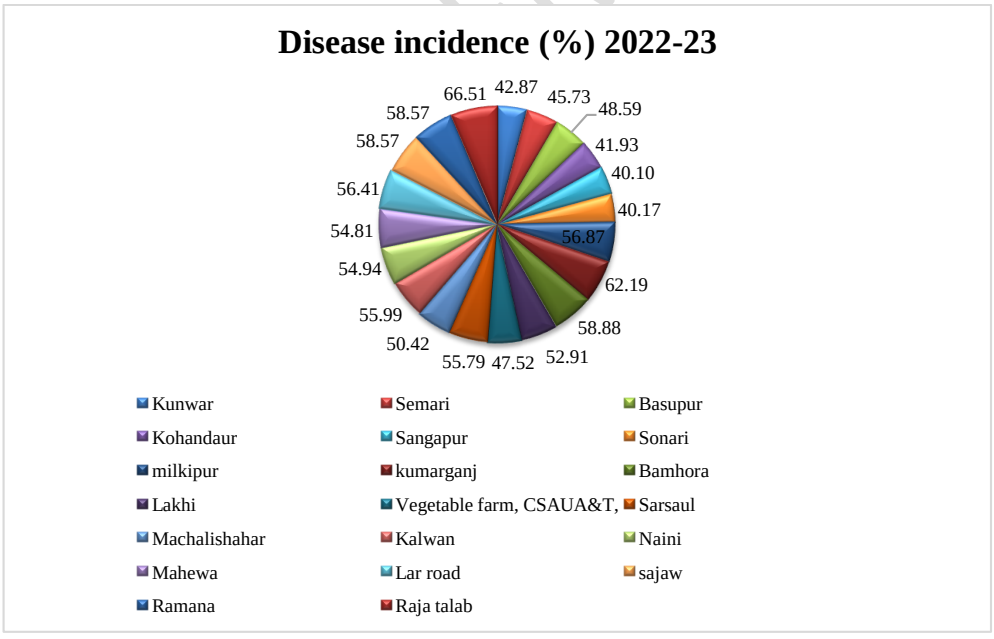

Fig.2: Disease incidence in villages of different districts of Uttar Pradesh during 2022-2023

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