



Status of Nail Head Canker of Apple in Himachal Pradesh

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ABSTRACT

Nummularia discreta causes nail head canker is a slowly spreading apple canker disease causing widespread losses in high quality apple was observed in the Kinnaur, Kullu, Mandi, Sirmaur, and Shimla districts of Himachal Pradesh during the regular canker development season, from May to December in 2017 and 2018. Disease incidence of nail head canker was recorded maximum at Sharbo in district Kinnaur (33.81%) followed by Chirgaon area of Shimla district (30.96%), whereas disease was totally absent in some places. Similarly, percent disease index of nail head canker was maximum at Chagaon (15.49%) followed by Nichar (15.21%) of Kinnaur district, while minimum percent disease index of 0.00 per cent was depicted from different location. The mean percent disease index of this canker ranged from 0.00 to 15.49 per cent during 2017 and 2018 crop seasons.

Key Words: Nail Head, Canker, Apple, Himachal Pradesh, Disease Incidence, Percent Disease Index

INTRODUCTION

The apple (*Malus x domestica* Borkh.) was first cultivated in Himachal Pradesh in the late 1900s (Singh *et al*, 2022a). Apple farming is carried out on 1,12,630 ha (Singh *et al*, 2022b) and the main source of income for farmer families, as well as for others employed in the industry as workers, transporters, middlemen, retailers, and so on. In 2017-18, Himachal Pradesh produced 4, 46,570 metric tonnes of apples, with an average productivity rate of 3.96 metric tonnes per hectare (NHB, 2018). However, in comparison to other parts of the world, this state's apple production per unit area is poor.

The occurrence of numerous diseases, as well as other factors such as bad quality material, insufficient technology, improper inputs, insufficient cooling units, changing climate, and so on, have all been major roadblocks to achieving the necessary output. Fungus, bacteria, viruses, and other microbes produce a variety of diseases that cause both immediate and long-term damage. Thakur (2008) reported that these diseases lead to 30-40% reduction in total yield. Root rot in the 1960s (Agarwala, 1961) which killed 10-15% of apple trees each year. From the late 1980s onwards, apple

scab epiphytotics (Gupta, 1978). Similarly, in a single year 1983, Gupta and Sharma (1995) reported losses of Rs. 1.5 crores with this disease and Marssonina blotch, which generated misery via early defoliation in the late 1990s (Sharma and Sharma, 2012), has been a source of concern for the state's apple growers.

In the 1970s, the state had a simultaneous outbreak of cankers (Agarwala and Gupta, 1971). Cankers wounds increase surface area from season to season and are localized lesions on a stem or branch that cause the sloughing away of plant. Thirteen different cankers were reported from Himachal Pradesh by Sharma and Sharma (2012) but there is yet no status update on the severity of individual pathogen associated with canker disease with different apple growing areas. The distribution patterns of nail head canker have been studied in numerous apple growing districts in Himachal Pradesh. Such information could be useful in determining the true state of the disease and its economic consequences. Furthermore, the distribution trends of nail head canker revealed in this survey would advise apple growers about canker resistant varieties to be transplanted in different elevations and geographic areas across the state.

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Table1. Prevalence of nail head canker (*Nummularia discreta*) in different apple growing areas of Himachal Pradesh.

Districts /Location	Disease incidence (DI) (%)		Mean DI (%)	Percent Disease Index (PDI) (%)		Mean PDI (%)
	2017	2018		2017	2018	
Kullu						
Amarbag	0.00	0.00	0.00	0.00	0.00	0.00
Batahar	0.00	1.45	0.73	0.00	0.74	0.37
Chowai	0.32	1.78	1.05	0.02	0.63	0.33
Dalighat	0.45	0.00	0.23	0.06	0.00	0.03
Gushaini	0.00	2.85	1.43	0.00	1.04	0.52
Javan	1.77	2.69	2.23	0.55	0.34	0.45
Kakhnal	0.00	0.00	0.00	0.00	0.00	0.00
Kamand	3.41	6.31	4.86	1.11	1.76	1.44
Karjan	0.00	0.72	0.36	0.00	0.04	0.02
Trambli	2.69	3.64	3.17	0.74	1.00	0.87
Naggar	9.87	11.59	10.73	4.90	7.26	6.08
Raison	1.24	0.98	1.11	0.67	0.10	0.39
Seobagh	0.46	5.27	2.87	0.09	2.54	1.32
Thati Bir	2.91	7.85	5.38	0.70	3.65	2.18
Thaila	3.57	5.36	4.47	2.02	2.42	2.22
Mean	1.78	3.37	2.57	0.72	1.43	1.08
Shimla						
Bamta	0.00	0.00	0.00	0.00	0.00	0.00
Bhutti	0.00	0.00	0.00	0.00	0.00	0.00
Chirgaon	8.57	11.28	9.93	4.37	5.65	5.01
Deha	0.00	0.00	0.00	0.00	0.00	0.00
Dhangvi	0.00	0.00	0.00	0.00	0.00	0.00
Ghoond	1.25	2.87	2.06	0.76	1.02	0.89
Jubbal	4.21	5.38	4.80	2.00	2.35	2.18
Kotkhai	1.62	2.96	2.29	0.66	0.95	0.81
Kumarsain	12.89	15.43	14.16	5.96	5.99	5.98
Maraog	0.00	0.00	0.00	0.00	0.00	0.00
Matiyana	1.58	3.73	2.66	0.26	0.35	0.31
Narkanda	19.23	20.75	19.99	5.47	9.06	7.27
Rohru	2.46	3.89	3.18	1.21	1.43	1.32
Sarahan	0.00	0.00	0.00	0.00	0.00	0.00
Shathla	2.07	3.41	2.74	0.62	0.35	0.49
Thanedhar	0.00	0.00	0.00	0.00	0.00	0.00
Theog	0.00	0.00	0.00	0.00	0.00	0.00

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Mean	3.17	4.10	3.63	1.25	1.60	1.43
Kinnaur						
Nichar	27.95	30.66	29.31	13.85	16.56	15.21
Bhavanagar	24.53	29.42	26.98	11.51	12.28	11.90
Chagaon	29.84	32.07	30.96	14.78	16.20	15.49
Katgaon	20.43	24.87	22.65	7.54	9.05	8.30
Kalpa	11.74	21.49	16.62	2.83	12.02	7.43
Sangla	21.37	26.73	24.05	17.46	12.50	14.98
Pangi	18.68	22.69	20.69	10.25	8.03	9.14
Kilba	14.97	29.42	22.20	3.14	6.66	4.90
Purbani	24.25	31.91	28.08	12.45	14.48	13.47
Pooh	11.78	25.75	18.77	5.30	12.59	8.95
Thangi	15.02	15.47	15.25	2.58	0.92	1.75
Moorang	16.84	12.99	14.92	6.31	4.13	5.22
Lippa	12.93	15.16	14.05	5.60	7.26	6.43
Chango	18.65	13.98	16.32	6.26	3.35	4.81
Sharbo	32.54	35.08	33.81	19.01	17.49	18.25
Mean	20.10	24.51	22.31	9.26	10.23	9.75
Sirmaur						
Hariphurdhar	0.00	0.00	0.00	0.00	0.00	0.00
Rajgarh	0.00	0.00	0.00	0.00	0.00	0.00
Charna	0.00	0.00	0.00	0.00	0.00	0.00
Sarahan	0.00	0.00	0.00	0.00	0.00	0.00
Nohradhar	0.00	0.00	0.00	0.00	0.00	0.00
Shillai	0.00	0.00	0.00	0.00	0.00	0.00
Sangrah	0.00	0.00	0.00	0.00	0.00	0.00
Mean	0.00	0.00	0.00	0.00	0.00	0.00
Mandi						
Janjehli	5.78	7.11	6.45	2.55	3.08	2.82
Karsog	0.46	0.29	0.38	0.06	0.04	0.05
Keolidhar	6.12	2.01	4.07	3.02	0.99	2.01
Kigas	0.50	0.25	0.38	0.06	0.02	0.04
Nihri	2.51	2.44	2.48	0.95	1.01	0.98
Thunag	4.73	3.48	4.11	3.47	2.15	2.81
Mean	3.35	2.60	2.97	1.69	1.22	1.45

MATERIALS AND METHODS

The survey was carried out in five apple-growing districts of Himachal Pradesh, namely Kinnaur, Kullu, Mandi, Shimla and Sirmaur, at different altitudes ranging between 1000-2500 m

above mean sea level (a.m.s.l). The survey was carried out during the normal canker development period, from July to December in 2017-18. The disease incidence was recorded.

The data regarding the percent disease index of nail head canker was recorded with the scale devised by Verma (1991) as follows:

0 = No lesion formation

1 = Lesion size of 0.1-5 cm²

2 = Lesion size of 5.1- 10 cm²

3 = Lesion size of 10.1-30 cm²

4 = Lesion size of more than 30 cm²

Percent disease index was calculated as per Mc Kinney (1923):

Per cent Diseases Index (%)	=	Sum of all numerical ratings	× 100
		Number of twigs/branches/ trunks observed × Maximum rating	

RESULTS AND DISCUSSION

The Nail head canker was widespread in Kinnaur, Kullu, Shimla and Mandi district of Himachal Pradesh in all the apple growing areas surveyed. Disease incidence of nail head canker was recorded maximum at Sharbo in district Kinnaur (33.81%) followed by Chirgaon area of Shimla district (30.96%), whereas disease was totally absent in some places as depicted in table. Similarly, percent disease index of nail head canker was maximum at Chagaon (15.49%) followed by Nichar (15.21%) of Kinnaur district, while minimum percent disease index of 0.00 per cent was depicted from different location. The mean percent disease index of this canker ranged from 0.00 to 15.49 per cent during 2017 and 2018 crop seasons.

The perusal of data depicted above further revealed that the mean incidence of nail head canker was maximum (22.31%) in Kinnaur district followed by Shimla (3.63%), whereas this disease was absent in Sirmaur district. Mean percent disease index of nail head canker was maximum at Kinnaur (9.75%) followed by Mandi district (1.45%), while no percent disease index was recorded in Sirmaur district.

These findings were in conformity with Kumar *et al* (2016), who had reported the highest incidence of nail head canker from Kinnaur (50%) district of Himachal Pradesh. Prevalence of this canker in other districts viz., Shimla, Sirmaur and Kullu was very less (2% in each

case). Earlier, Sharma and Bhardwaj (1999) also reported the occurrence of this canker in Himachal Pradesh. Kumar *et al* (2016) explained the reason behind the high disease incidence of this canker in district Kinnaur because that disease infection occurs more through frost cracks. Frosting is a more common phenomenon in Kinnaur with winter temperature ranging between -5 to -10°C in winters. It seems that higher temperature ranging above 0°C during winter months did not favour development of nail head canker as revealed by very low disease severity in the districts of Shimla, Sirmaur and even in district Kullu.

CONCLUSION

It can be concluded that nail head canker problem was becoming severe in Kinnaur and Shimla district of Himachal Pradesh. Disease incidence was absent in Sirmaur district. However, pathogen has a slow growing nature and disease infection occurs more through frost cracks. The disease will be more important in higher apple growing areas of Himachal Pradesh where winter temperature remains less than 0°C.

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