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Effects of botanicals on powdery mildew of pea (*Erysiphe pisi*)

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Abstract

The powdery mildew disease of pea caused by *Erysiphe pisi*, has emerged as a serious problem in most of the pea growing area of India, leading to considerable yield loss in pea production. Symptoms of powdery mildew appeared on upper surface of leaves, pods and on stem. The intensive survey was conducted at the reproductive stage to record the disease incidence of powdery mildew in major pea growing blocks of Ranchi district during *rabi* 2021-2022. On an average 30.00% disease incidence recorded in Ranchi district. Among the different blocks, highest disease incidence recorded 34.00% in Mandar block and lowest reported 26.00% in Bero block, Ranchi. Field level management of powdery mildew of pea using botanicals were evaluated during *Rabi* 2021-2022. Percent disease incidence (PDI) was low 17.50 percent, when sprayed of neem leaf extract (10%), followed by *Lantana camara* leaf extract 45.00 percent, Eucalyptus leaf extract 47.50 percent and Marigold leaf extract 57.50 percent. Microscopic observation after 24 hr, 48 hr, and 72 hr. of botanicals spray revealed that 10% neem leaf extract found to be highly effective against powdery mildew pathogen and affects conidia, conidiophore and hyphae of fungus.

Keywords: Powdery mildew; peas; botanicals; neem leaf extract; *Erysiphe*

Introduction

Pea is an important frost-hardy, cool-season, nutritious leguminous vegetable crop. The common name of garden pea (*Pisum sativum* var *hortense*) is otherwise called 'vegetable pea'. Pea is a winter season crops grown in numerous areas of the world. It contains enormous amount of protein and essential amino acids especially lysine (Nawab *et al.* 2008) [5]. Large number of fungal, bacterial and viral diseases affects pea plant. Various important diseases viz., seed and root rot (*Pythium aphanidermatum*), wilt (*Fusarium* sp.), foot rot and blight (*Ascochyta* sp.), powdery mildew (*Erysiphe pisi*), bacterial blight (*Pseudomonas syringae* pv. *syringae*), soft rot (*Erwinia* sp.) and pea mosaic disease etc. are known to be important (Sharma, 2007) [8]. In India, powdery mildew of pea is known since as early as 1910. It usually develops late in the season reaching its maximum intensity when pods are forming. It is worst in dry weather unlike the downy mildew which flourishes in wet weather. Early varieties are less damaged. Varieties maturing in January usually escape the maximum intensity of the disease. It is one of the most common and serious fungal disease and occurs almost every year in severe epidemic form, during warm and dry weather and night temperature at or below the dew point. Pea powdery mildew caused by *Erysiphe pisi* DC is an air-borne disease (Smith *et al.* 1996) [9]. The first symptoms are small diffusing, light-coloured spots on the upper surface of the lowest and oldest leaves. These lesions have become covered by white, powdery fungal colonies (Reiling, 1984) [7]. Mycelial hyphae produce short conidiophores on the plant surface. Conidia are usually borne singly on conidiophores (Falloon *et al.* 1989) [2] and are disseminated mainly by wind to cause secondary infections.

Materials and Methods

The study on the survey and field experiment against Powdery Mildew of pea (*Erysiphe pisi*), conducted during *Rabi* 2021-2022. Field Experiment were conducted in the experimental site of RKMVERI and lab experiment conducted in Plant Pathology, Laboratory, RKMVERI, Ranchi, Jharkhand. Survey of disease incidence (fig- 1) conducted in different blocks and villages that given in table 1. The following four botanicals or treatments (table 2) applying as 10% foliar spray in RBD with four replication on pea field in RKMVERI experimental plot. Microscopy work conducted and observe powdery mildew infected leaves were examined primarily with a hand-lens and then with a compound microscope for detailed study.

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A piece of clear tape was placed on infected leaves and then stripped off to remove fungal structures. The tape was then placed on a microscope slide with a drop of distilled water. The microscopic observations were carried out for morphological characteristics of mycelia on the host, size and shape of conidia and conidiophores.



Fig 1: Surveying of powdery mildew of pea in Bansjari, Mandar Block

Table 1: List of Blocks and Villages for record the disease incidence (D.I.) of powdery mildew of pea.

Sl. No.	Name of Blocks	Village Location
1.	Angara	Nagraber
		Barwatoli
		Rangamati
		Getalsud
		Khaksi Toli
2.	Bero	Ita
		Karangi
		Lamkana
		Dighiya
		Jariya
3.	Mandar	Gurgurjari
		Kaimbo
		Bansjari
		Murjali
		Sargaon
4.	Ormanjhi	Ara
		Keram
		Kukui
		Tundahuli
		Bijang
5.	Nagri	Barsa
		Patracholi
		Kesaro
		Sukda
		Saher

Table 2: List of Botanicals and their doses.

Sl. No.	Botanical Extracts	Botanical Name	Dose (%)
01	Neem leaf	<i>Azadirachta indica</i>	10
02	<i>Lantana camara</i> leaf	<i>Lantana camara</i>	10
03	Marigold leaf	<i>Tagetes erecta</i>	10
04	<i>Eucalyptus</i> leaf	<i>Eucalyptus globulus</i>	10

Result and Discussion

The survey data revealed that the Disease incidence ranged from 26.00 to 34.00 per cent with average of (30.00%). The maximum percent of disease incidence (50%) was observed in Nagarabera, followed by 40 per cent in Bansjari, Sargaon, Bijang, Barsa and Sukda, 30 percent disease incidence Rangamati, Getalsud, Karangi, Dighiya, Jariya, Gurgurjari, Kaimbo, Murjali, Ara, Tundahuli, Kesaro and Maisa. The lowest percent of disease incidence was found in Barwatoli, Khaksi toli, Ita, Lamkana, Keram, Kukui and Patracholi (20.00%) table 3 fig 2 & 3. The pea crops damage substantially in the Ranchi district of Jharkhand state due to the disease powdery mildew. Similar to present work earlier Parthasarathy (2016) [6] conducted an intensive survey was carried out in different villages of Nilgiris district in Tamil Nadu for observing the powdery mildew disease in pea and Bhendi. In the case leaf infection, highest PDI (70.19%) was recorded in Bingigigal village, followed by Melcavatty (66.98%) and Nanjanadu (65.77%). The least incidences of powdery mildew were recorded in Thummanatty village. Bingigal village recorded maximum PDI of (65.92%) in pods, followed by Melcavatty (63.18%) and Nanjanadu (62.84%). Wahul *et al*, (2018) [10] conducted intensive survey against powdery mildew (*Erysiphe cichoracearum* D.C.) of Cucumber (*Cucumis sativus* L.) in jalna and Aurangabad district of Maharashtra and found the disease incidence ranged from 20.10 to 47.28% & 20.12 to 46.38% in Jalna and Aurangabad District respectively. The highest disease incidence was found in Saini Cultivar (47.28%) in Chomanwadi village & Saini Cultivar (46.38%) in Harnabadwadi village and lowest incidence was found in Swati Cultivar (20.10%) & Saini cultivar (20.53%) in Shendra village in Jalna and Aurangabad District respectively. The field data revealed that the percent disease incidence was low 17.50 percent, when the 10% neem leaf extract used as spray at weekly interval from 30 days after sowing followed by 10% *Lantana camara* leaf extract 45.00 percent, Eucalyptus leaf extract 47.50 percent, marigold leaf extract and control 57.50 percent. From the ANOVA, we can suggest that the treatments are significant with T1 found to be effective for management of disease whereas T2 found the second best followed by T4. Control and T3 are at par as for the disease is concerned (table 4, fig – 4).

Table 3: Incidence of Powdery mildew disease in different Blocks of Ranchi district during Rabi 2021.

Sl. No.	Name of Block	Village Location	Disease Incidence (D.I) (%)	Average (%)
1.	Angara	Nagraber	50	30.00
		Barwatoli	20	
		Rangamati	30	
		Getalsud	30	
		Khaksi Toli	20	
2.	Bero	Ita	20	26.00
		Karangi	30	
		Lamkana	20	
		Dighiya	30	
		Jariya	30	

3.	Mandar	Gurgurjari	30	34.00
		Kaimbo	30	
		Bansjari	40	
		Murjali	30	
		Sargaon	40	
4.	Ormanjhi	Ara	30	28.00
		Keram	20	
		Kukui	20	
		Tundahuli	30	
		Bijang	40	
5.	Nagri	Barsa	40	32.00
		Patracholi	20	
		Kesaro	30	
		Sukda	40	
		Saher	30	
Mean				30.00

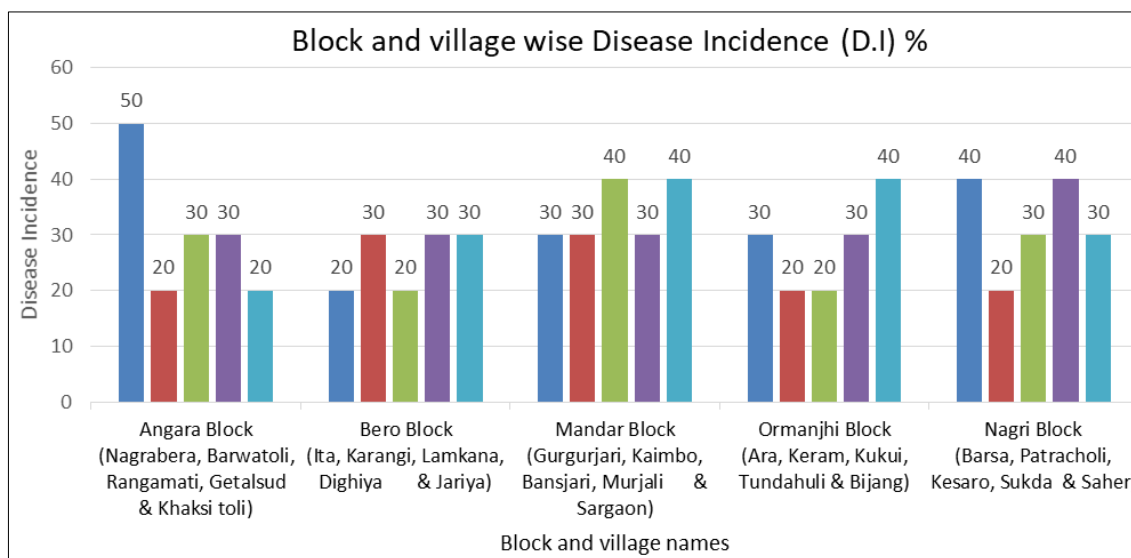


Fig 2: Bar diagram showing disease incidence of powdery mildew in different villages.

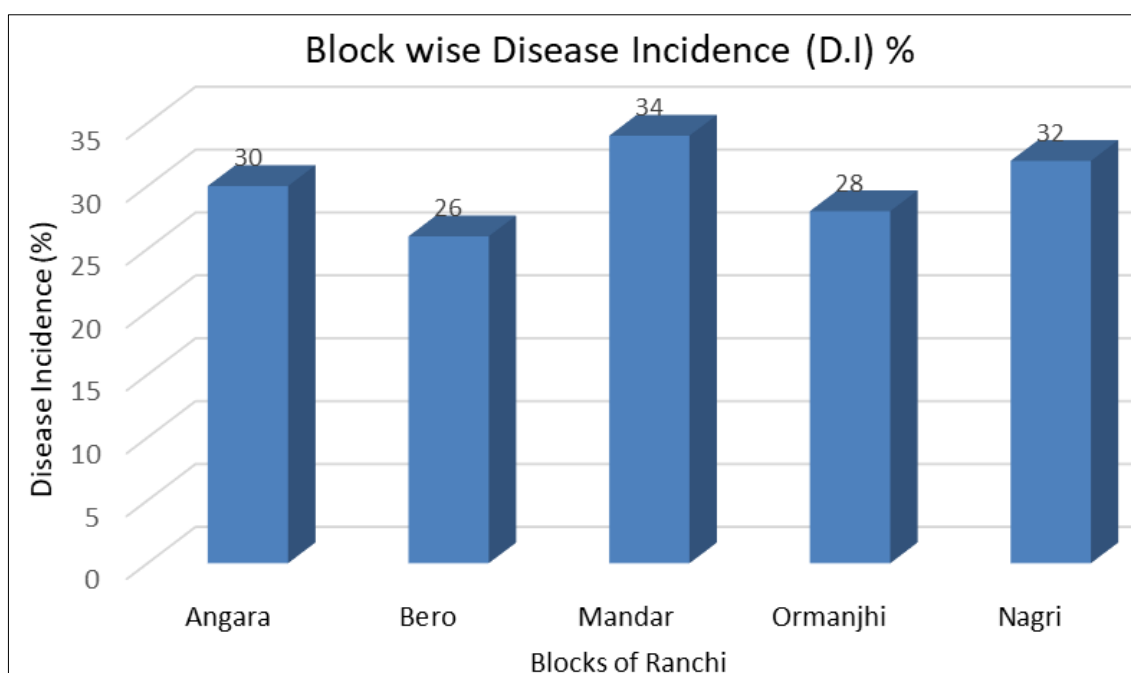
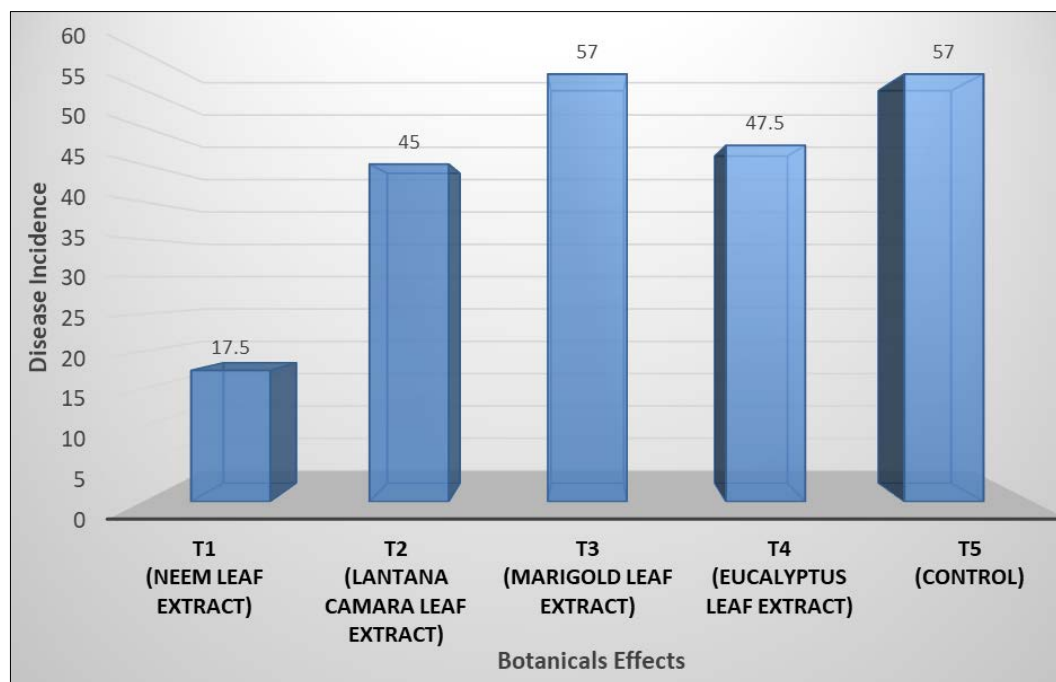


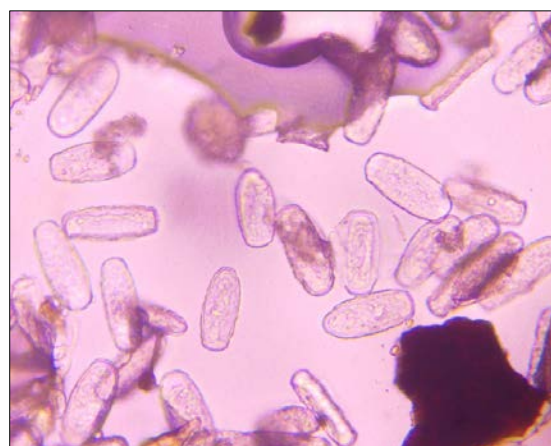
Fig 3: Bar diagram showing disease incidence of powdery mildew in different Blocks of Ranchi.**Table 4:** Effects of different botanicals on inhibition of powdery mildew of pea.

Sl. No.	Treatments	Disease Incidence (DI)%
1	T1 (Neem Leaf Extract)	17.50
2	T2 (<i>Lantana camara</i> Leaf Extract)	45.00
3	T4 (Eucalyptus Leaf Extract)	47.50
4	T3 (Marigold Leaf Extract)	57.50
5	T5 (Control)	57.50
	SEm (\pm)	1.826
	C.D (P= 0.05)	5.688
	SE (d)	2.582
	C.V	8.114

**Fig 4:** Effects of botanicals on disease incidence of powdery mildew of pea.

In the present study four different botanicals (10%) were tested against powdery mildew of pea (*Erysiphe pisi*) under field condition. After 24 hours, 48 hours and 72 hours of spray microscopic observation (fig – 5, 6 & 7) revealed that botanical (Neem Leaf Extract) caused collapse of conidiophore, inhibition of conidia germination, delay in fungal growth, morphological anomalies and rapid collapse of mycelium. Shape of conidia also changed from cylindrical to spherical and tip became swollen. Some of the conidia burst and release of globular structures and metabolites. Result also revealed that 10% neem leaf extract showed better result compare to other botanicals used in experiment. Similar type of work conducted by Marakna and Kapadiya (2020) [3] finds the efficacy of various phyto extract against *Erysiphe polygoni*. Seven different phytoextracts were tested in different concentrations and different time of interval 24, 48 and 72 hours, respectively. Out of seven phytoextracts two phytoextracts showed more than 50% inhibition at all concentrations on different time interval that are Garlic and neem leaf extracts. Both treatments found best in spore germination inhibition and highest spore germination inhibition at all the concentrations on different 24, 48 and 72 hours of time interval. Also Maurya *et al.* (2004) [4] have reported more than 80 per cent spore germination inhibition of *E. pisi* causing powdery mildew in pea with neem and

moth. In addition, they showed that *Allium sativum*, *A. cepa*, and *Zingiber officinale* are also effective in reducing disease and conidial germination. The same results were also reported by Dhaliwal *et al.* (2002) [1]. They indicated that complete inhibition of conidial germination of *Uncinula necatar* causing powdery mildew of grapevine with phyto extract of garlic (*Allium sativum*).

**Fig 5:** Effects of neem leaf extract on powdery mildew fungus after 24 hrs of spray

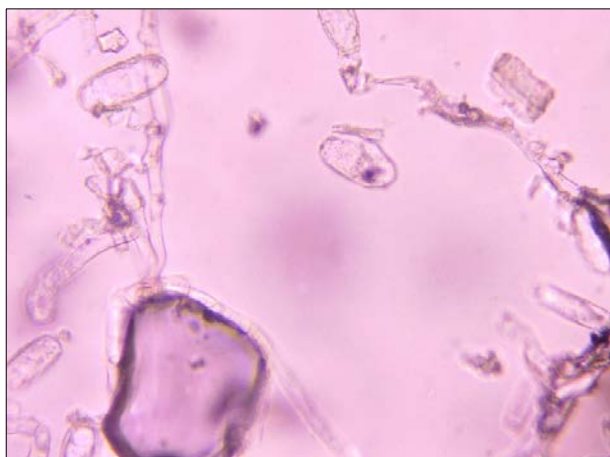


Fig 6: Effects of neem leaf extract on powdery mildew fungus after 48 hrs of spray.



Fig 7: Effects of neem leaf extract on powdery mildew fungus after 72 hrs of spray.

Conclusion

The intensive survey of major pea growing area of Ranchi, Jharkhand recorded 30% disease incidence of powdery mildew during rabi 2021-2022. Among all treatment; 10% Neem leaf extract shows minimum disease incidence followed by 10% Lantana camara leaf extract, followed by 10% Eucalyptus leaf extract and other 10% Eucalyptus leaf extract & control shows highest disease incidence. Microscopic observation after 24 hr, 48 hr and 72 hr of spraying botanicals revealed that 10% Neem leaf extract found highly effective on powdery mildew.

References

1. Dhaliwal HS, Thind TS, Chander M, Chhabra BR. Activity of some essential oils against *Uncinula nectar* causing powdery mildew of grapevine. *Indian Phytopathology*. 2002;55(4):529-531.
2. Falloon RE, S, PW, Hallett IC. Morphology of *Erysiphe pisi* on leaves of *Pisum sativum*. *Canadian Journal of Botany*. 1989;67:3410-3416.
3. Marakna NM, Kapadiya HJ. Efficacy of different phytoextracts against *Erysiphe polygoni* DC causing powdery mildew of fenugreek. *Journal Pharmacognosy Phytochemistry*. 2020;9(6):1660-1663.
4. Maurya S, Singh DP, Srivastava JS, Singh UP. Effect of some plant extracts on pea powdery mildew (*Erysiphe pisi*). *Annals of Plant Protection Sciences*. 2004;12(2):296-300.

5. Nawab NN, Subhani, GM, Mahmood K, Shakil Q, Saeed A. Genetic variability, correlation and path analysis studies in garden pea (*Pisum sativum* L.). *Journal of Agricultural Research*. 2008;46(4):333-340.
6. Parthasarathy S. Survey of the Incidence and Severity of Bhendi (*Abelmoschus esculentus* (L.) Moench.) and Peas (*Pisum sativum* L.) Powdery Mildew Diseases in Tamil Nadu, India. *Advances in Life Sciences*. 2016;5:808-814.
7. Reiling TP. Powdery mildew in D. J. Hagedorn, ed. *Compendium of pea diseases*. American Phytopathological Society, 1984, 21-22.
8. Sharma A, Sood M, Rana A, Singh Y. Genetic variability and association studies for green pod yield and component horticultural traits in garden pea under hill dry temperate conditions. *Indian Journal of Horticulture*. 2007;64(4):410-414.
9. Smith PH, EM, Foster LA, Boyd, JKM Brown. The early development of *Erysiphe pisi* on *Pisum sativum* L. *Plant Pathology*. 1996;45:302-309.
10. Wahul SM, Jagtap GP, Rewale KA, Bhosale RP. Survey on Powdery Mildew of Cucumber in Aurangabad and Jalna Districts. *International Journal of Current Microbiology and Applied Sciences*. 2018;7:1618-1624.