



## RESEARCH PAPER

# Management of powdery mildew of linseed by using plant defence inducers

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**Abstract :** A field experiment was conducted during *Rabi* 2019-2020 at AICRP on Linseed and Mustard College of Agriculture Nagpur to study the impact of plant defence inducers product on disease control in linseed. Among the ten different treatment tested the standard check hexaconazole (0.1%) followed by Seed treatment with salicylic Acid at 100 ppm + Foliar spray of sodium propionate (1%) was found most effective in minimizing the severity of powdery mildew 25.68 % and 29.39% respectively and significantly superior. Seed treatment with salicylic Acid at 50 ppm + Foliar spray of sodium propionate (1%) and Seed treatment with salicylic Acid at 100 ppm + Foliar spray of salicylic acid at 100 ppm and were remain at par with each other in reducing the disease intensity over control (62.90%). Maximum seed yield 1334 kg/ha was obtained with hexaconazole (0.1%) followed by Seed treatment with salicylic Acid at 100 ppm + Foliar spray of sodium propionate (1%) (1210 kg/ha). The highest ICBR (5.68) was recorded with hexaconazole (0.1%) *i.e.* 8.87 followed by Seed treatment with salicylic Acid at 100 ppm + Foliar spray of sodium propionate(1%).

**Key Words :** Linseed, Powdery mildew, Salicylic acid, Hexaconazole, Sodium propionate

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## INTRODUCTION

Linseed (*Linum usitatissimum*) is an important oilseed crop grown for both seed as well fibre. The major linseed growing states of the country are Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Maharashtra, Bihar, Odisha, Jharkhand, West Bengal, Nagaland and Assam it mainly grown for oil purposes. Madhya Pradesh is the leading state both in area and production followed by Jharkhand and Uttar Pradesh. Linseed occupies an area of 32.63 lakh ha yielding 31.82 lakh tones with an average productivity of 975 kg per hectare in the world

(FAO Stat.2018) whereas in India, it occupies an area of 1.72 lakh ha with a production and productivity of about 0.99 lakh tones and 574 kg/ha, respectively. Practically every part of linseed plant is commercially utilized either direct or after value addition. On a small scale, its seed and oil directly used for human consumption, such as flax seed breads, bagels and other baked and fried cuisine. It is basically an industrial crop and about 80 per cent of soil is utilized by paints, varnishes, coating oil, linoleum, pad and printing inks, leather and soap industries. Linseed is highly nutritious

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and protects from several diseases. It is source complete protein comprising all eight essential amino-acids, high order lino lenic acid (Omega-3 fatty acid) carbohydrates, vitamins and minerals. Recent medical researchers have found linseed as best herbal source of Omega-3 fatty acid Omega-6 fatty acids which have a lot of improving effect on human metabolism. Its stem provides good quality fibre which is lustrous and can be blended with wool, cotton silk, rayon and polyester well. Among the various diseases, powdery mildew *Oidium lini* has been identified as one of the serious problem particularly in late sown crops normally in Vidharbha. The disease appears after mid of January at the time of capsule formation or seed setting the powdery growth was observed on entire plant. The capsules were also covered with powdery mass therefore, the investigation was undertaken to study the efficacy of fungicides against the disease.

## MATERIAL AND METHODS

Field trials were conducted at AICRP on Linseed and Mustard College of Agriculture Nagpur, Maharashtra (India) using Randomized Block Design with ten treatments with three replications during 2019-2020.

Seed treatment was given with Salicylic Acid (SA) at 50 ppm and 100 ppm and spraying of plant defence inducers product at 30 and 45 DAS. Disease intensity was evaluated by using 0-5 scale (Mayee and Datar, 1986) and data was statistically analyzed. The incremental cost benefit ratio (ICBR) was calculated by taking the total yield per ha. The gain in yield as compared to the untreated check to the treatments was calculated by taking seed yield *vis-a-vis* amount spent (according to the prevailing market rates of the chemical, labours and selling price of linseed).

The method of observations for Powdery mildew was scored with following 0-5 scale:

0 = No disease or free (HR)

1= 0 to 10% area of leaves/plant infection (R)

2= 10.1 to 25% area of leaves/plant infection (MR)

3 = 25.1 to 50% area of leaves/plant infection (MS)

4 = 50.1 to 75% area of leaves/plant infection (S)

5 = Above 75% area of leaves/plant infection (HS)

## RESULTS AND DISCUSSION

The results revealed (Table 1) that out of nine different treatment tested the standard check

**Table 1 : Effect of plant defence inducers on powdery mildew intensity (PDI), seed yield of linseed and ICBR**

Sr. No.	Treatments	Powdery mildew PDI	Seed yield kg/ha	Yield increased over control (kg/ha)	Yield increased over control (Rs/ha)	Cost of Protection			NET Monetary Return (Rs./ha)	ICBR
						Cost of Treatment (Rs./ha)	Wages and sprayer charges (Rs./ha)	Total cost of produce (Rs./ha)		
1.	Seed treatment with salicylic Acid (SA)At 50ppm	43.90 (41.45)	1016	100.0	5000.0	100	1250	1350	3650	2.70
2.	Seed treatment with salicylic Acid (SA)At 100ppm	41.62 (40.15)	1057	141.0	7050	200	1250	1450	5600	3.86
3.	T <sub>1</sub> +Foliar spray of salicylic acid(SA) At 50ppm At 30 And 45 DAS	33.66 (35.45)	1116	200.0	10000	300	1250	1550	8450	5.45
4.	T <sub>2</sub> +Foliar spray of salicylic acid (SA) At 100ppm At 30 And 45 DAS	32.39 (34.67)	1143	227.0	11350	600	1250	1850	9500	5.14
5.	T <sub>1</sub> +Foliar spray of Monopotassium phosphate(1%) At 30 And 45 DAS	37.32 (37.63)	1027	111.0	5550	650	1250	1900	3650	1.92
6.	T <sub>2</sub> +Foliar spray of Monopotassium phosphate(1%) At 30 And 45 DAS	36.53 (37.14)	1074	158.0	7900	750	1250	2000	5900	2.95
7.	T <sub>1</sub> +Foliar spray of sodium propionate (1%) At 30 And 45 DAS	32.37 (34.65)	1188	272.0	13600	850	1250	2100	11500	5.48
8.	T <sub>2</sub> +Foliar spray of sodium propionate (1%) At 30 And 45 DAS	29.39 (32.78)	1210	294.0	14700	950	1250	2200	12500	5.68
9.	Foliar spray with hexaconazole (0.1%) disease initiation followed by second after 10 days interval.	25.68 (30.40)	1334	418.0	20900	868	1250	2118	18782	8.87
10.	Control (no spray)	62.90 (52.48)	916	--	--	--	--	--	--	--
	S.E. (m) ±		1.361	70.694						
	C.D. (P=0.05)		4.074	211.67						
	C.V. %		6.255	11.05						

hexaconazole (0.1%) followed by Seed treatment with salicylic Acid (SA) At 100ppm +Foliar spray of sodium propionate (1%) was found most effective in minimizing the severity of powdery mildew 25.68 % and 29.39% respectively and significantly superior. Seed treatment with salicylic Acid (SA) at 50ppm +Foliar spray of sodium propionate (1%) and Seed treatment with salicylic Acid (SA) at 100ppm + Foliar spray of salicylic acid (SA) at 100ppm and were remain at par with each other in reducing the disease intensity over control (62.90%). Maximum seed yield 1334 kg/ha was obtained with hexaconazole (0.1%) followed by Seed treatment with salicylic Acid (SA) at 100 ppm + Foliar spray of sodium propionate (1%) (1210 kg/ha) and Seed treatment with salicylic Acid (SA) at 50ppm +Foliar spray of sodium propionate (1%) (1188 kg/ha) and was remain at par with each other and significantly superior over rest of the treatments including control (916 kg/ha). The highest ICBR was recorded with hexaconazole (0.1%) *i.e.* 8.87 followed by Seed treatment with salicylic Acid (SA) at 100ppm + Foliar spray of sodium propionate (1%) (5.68). Lowest ICBR recorded with Seed treatment with salicylic Acid (SA) at 50 ppm + Foliar spray of Monopotassium phosphate (1%) *i.e.* 1.92.

#### Conclusion:

Foliar spray of hexaconazole (0.1%) followed by

Seed treatment with Salicylic Acid (SA) at 100 ppm + Foliar spray of sodium propionate (1%) was found most effective in minimizing the severity of powdery mildew which results in maximum seed yield and ICBR ratio.

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