Original Research Article

Application Of SAR Activator For Management Of Pea Powdery Mildew (*Erysiphe Polygoni*)

Abstract

Powdery mildew of pea is one of the foremost diseases of pea incited by *Erysiphe polygoni*DC.Key symptoms of powdery mildew disease are the presence of silver floury patches appeared on the leaves as well as stems, tendrils, pods and in the severe condition its cover whole plant parts except root region and finally plant become older and later stage of the crop whole plant become comparatively greyish brown and the infected parts convey dull appearance. In extreme condition infected pods and leaves fall down from the plant. An experiment was conducted at farm of SKNCOA, Jobner during *Rabi* season 2021. Five SAR activators along with control *viz*. Ethylene (100 ppm), Salicylic acid (250 ppm), Hydrogen peroxide (200 ppm), Fosetyl AL (1000 ppm)and Benzothiadiazole (1000 ppm) were applied as two foliar sprays. During evaluation, all the treatments were found effective against powdery mildew of pea but Salicylic acid (250 ppm) and Fosetyl AL (1000 ppm)were found as best treatment to control powdery mildew disease of pea.

Keywords: SAR Activator, Pea, Powdery Mildew, Disease management

Introduction

Pea (Pisum sativum L.) is a significant legume vegetable crop from the Leguminosae family (Tulbek et al., 2017). Peas are an important nutritional component, including carbohydrates, proteins, and fiber. Various abiotic and biotic factors diminish pea profitability for producers by limiting output over time. India ranks second to China in terms of both area and output (NHB, 2018). In 2017-18, the country produced 540,000 hectares of garden peas with a yield of 5422.01 mt/ha, accounting for 21% of world output (NHB, 2018). Uttar Pradesh, Orissa, Karnataka, Bihar, Haryana, Punjab and Himachal Pradesh are India's leading pea producers (NHB, 2018).

The vegetable pea fits to the family (*Fabaceae*) *Leguminosae*. "*Pisumsativum* L." sub species "*Hortense*" initiated from common field pea. *Pisum sativum* sub species "*arvense*" is considered to be native to Ethiopia, the Mediterranean and Central Asia. It has chromosome number 2n=14.

Duke (1981) reported that peas are of four types i.e. Garden pea (*Pisum sativum* spp. *Hortense*, Field pea (*Pisum sativum* spp. *arvense* (L.) Poir.), Edible podded peas (*Pisum* sativum spp. *Macrocarpon*,) and Early dwarf pea (*Pisumsativum* var *humile*). Pea was probably originated in Southwestern Asia, possibly in Northwestern India, Pakistan or adjacent areas of former USSR and Afghanistan. Pea was found in Switzerland dating back to about 7000 BC, in China in the first century, in America soon after Columbus and in Austria in 1922. This crop was grown by the Greeks and Romans, (Makasheva, 1983).

Frost can damage the plants during flowering stage. High humidity and gloomy weather condition results into spread of fungal diseases like damping-off and powdery mildew. Favorable temprature for growth is13-18^{0}C. pea is affected by various fungal and bacterial diseases in high humid condition.

Nutrient value in pea, generally pea seed contain 17 to 22 g carbohydrates, 20 to 50 g starch, 14 to 26 g dietary fiber, 6.2 to 6.5 g protein, 0.4 g fat, 1.0 g ash per 100 g with 9 to 10 mg calcium, 3 to 5 mg sodium, 97 to 99 mg potassium per advance techniques like pulse electric field or ultra-sonication have shown remarkable impact on the efficiency by improving nutritional quality and techno functional properties of pea and its protein (Ma *et al*., 2018 and Melchior *et al*., 2020).

The crop is very much valuable in crop rotation (Duke, 1981).it is important legume crop next to soybean, groundnut and beans (Hules, 1994). Field pea contains 5 to 20 per cent less of the trypsin inhibitors than soybean and it allow directly fed to livestock without having to go through the extrusion heating process. In india pulses productivity low because its grown marginal lands and low rainfall areas, poor management practices using by farmers.

Powdery mildew disease is the one of the major disease of pea which occurs globally in the countries viz., India, Philippines, Brazil, South Australia, Sri Lanka, Bangladesh, Pakistan, Tropical Africa, Taiwan, Thailand, Tropical Africa, France, USA,

Pakistan, China, Russia, Canada and many other areas of the world it restrained major disease.

In India, powdery mildew (*Erysiphe polygoni* DC) was reported to occur and cause heavy qualitative and quantitative loss in pea, urdbeanmungbean, methi and many other important pulse crops grown in the states of Rajasthan, Maharashtra, Karnataka, Andhra Pradesh, Orissa, Madhya Pradesh and Tamilnadu (Khosla *et al,* 1988).

Powdery mildew is the major disease of pea throughout the world and it is the air borne disease worldwide distribution in severe form it reduces 24-27% pod weight, 21-30% pod number and up to 70% reduction in total yield loss (Pramod and Dwivedi 2007).

The yield losses were reported to the tune of 50 to 90% when the intensity was high at pod formation stage (Surwase*et al,* 2009).

Yield loss of 10-65% due to the disease has been reported (Tiwari *et al*., 1997).

Materials and methods

Field evaluation of SAR activators

The field experiment was conducted to find out the comparative performance of SAR for control of powdery mildew in a randomized block design with six treatments including control and three replications with plot size of 2 x 1.2 m^2 during 2021. Sowings were done in the last week of November in this year. Following treatments were taken during study.

Table- 1 List of SAR activators

Treatment	**SAR activators**	**Concentration (ppm)**
T_1	Ethylene	100
T_2	Salicylic acid	250
T_3	Hydrogen peroxide	200
T_4	Fosetyl Al	1000
T_5	Benzothiadiazole	1000
T_6	Control(water)	-

Foliar applications of SAR were done at 30 days after sowing (before disease appearance). Per cent disease intensity was recorded by examining 20 leaves from 10 randomly selected plants in each plot starting from the initiation of disease using 0-5 rating scale **(**McKinney 1923**).** The results were analysed statistically.

Results and Discussion

To measure the efficacy of various SAR activators, five SAR were evaluated for management of powdery mildew of pea by spraying one time at 30DAS under field condition.

Result presented that all SAR activators were found significantly greater to control. Salicylic acid noted minimum 25.71 per cent disease intensity by decreasing 55.07 per cent disease intensity. Fosetyl AL was next best noted 30.45 per cent disease intensity with decreasing 46.78 per cent disease intensity over control. (Table 2)

Benzothiadiazole and Ethylene noted 33.85 and 36.33 per cent disease intensity respectively with reduction 40.85, 36.50 per cent disease intensity over control. Hydrogen peroxide with 38.53 per cent disease intensity.

Table- 2 Effect of SAR activators on powdery mildew of pea under natural field condition

Treatment	SAR activators	Concentration (ppm)	*PDI	Per cent disease control
T_1	Ethylene	100	36.33 (37.07)	36.50
T_2	Salicylic acid	250	25.71 (30.47)	55.07
T_3	Hydrogen peroxide	200	38.53 (38.37)	32.66
T_4	Fosetyl Al	1000	30.45 (33.49)	46.78
T_5	Benzothiadiazole	1000	33.85 (35.58)	40.85
T_6	Control	-	57.22 (49.15)	0.00
	Sem±		0.52	
	CD (p=0.05)		1.60	

*Average of three replication

Figure in parenthesis are angular transformed values

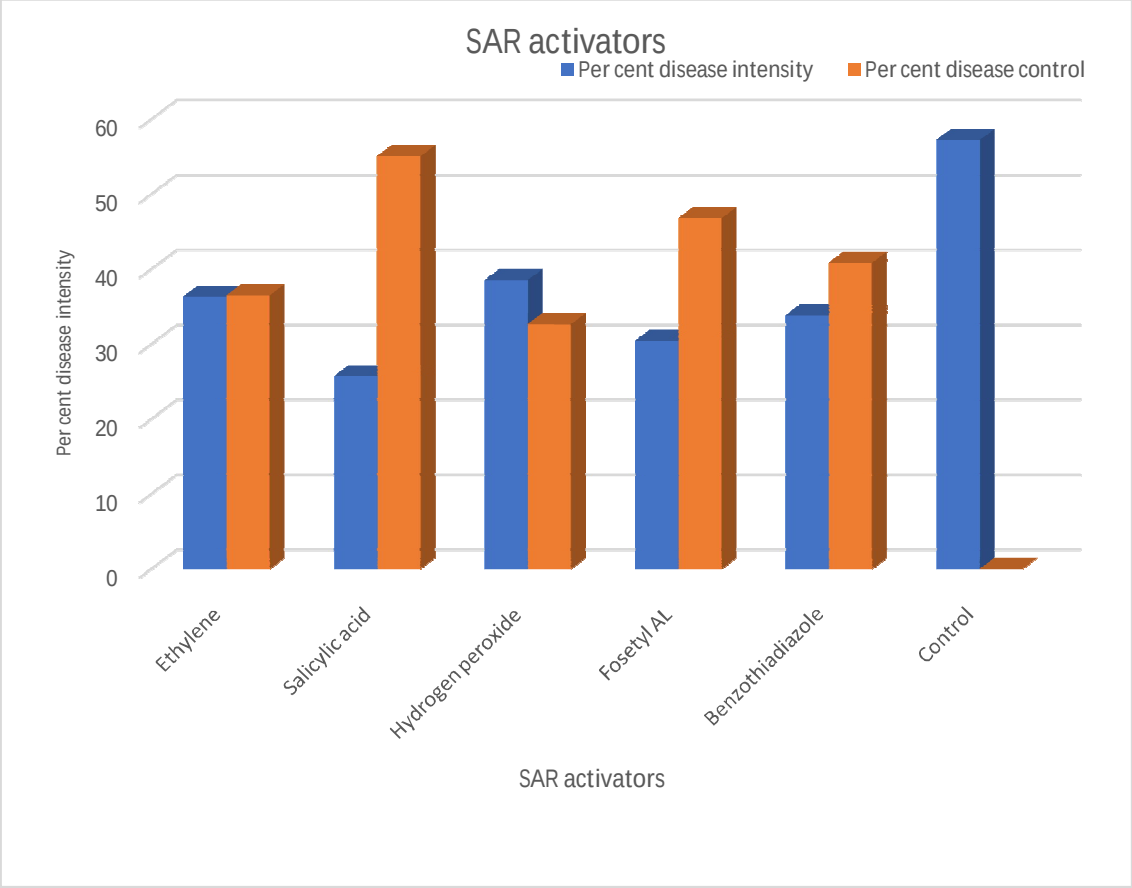

Fig. 1 Effect of SAR activators on powdery mildew of pea under natural condition.

Conclusion

Among five SAR activators, salicylic acid was recorded effective in controlling powdery mildew of pea 25.71 per cent disease intensity by decreasing 55.07 per cent disease intensity over control and second best recorded fosetyl Al.

Disclaimer (Artificial intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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