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Manoj Kumar MeenaDepartment of Plant Pathology,
Sri Karan Narendra Agriculture
University, Jobner, Jaipur,
Rajasthan, India**Shailesh Godika**Department of Plant Pathology,
Sri Karan Narendra Agriculture
University, Jobner, Jaipur,
Rajasthan, India**Kavita choudhary**Department of Plant Pathology,
Sri Karan Narendra Agriculture
University, Jobner, Jaipur,
Rajasthan, India

Effective management of powdery mildew disease of pea (*Erysiphe polygoni*) by botanicals

Manoj Kumar Meena, Shailesh Godika and Kavita choudhary

Abstract

Disease appeared in first week of January and reaches its peak in March. Powdery mildew disease is easily detected by the presence of white floury patches appearing on both sides of the leaves as well as tendrils stem, pods etc. In extreme severe conditions it causes significant losses in quantity as well as quality of seed. Out of five fungicides evaluated for their efficacy for the control of powdery mildew in pea.

Keywords: Bio-agents, biocides, botanicals, plant extract, pea powdery mildew

Introduction

In India, pea is widely grown in an area of 546 thousand ha (it is 5.2% of total vegetable area), with production of 5452 thousand million tones (it is 2.9% of total vegetable production) and productivity 9.98 million tons/ hectares. Maximum cultivation of pea is in the North India (Uttar Pradesh and Madhya Pradesh) which account for about 58.4 per cent area under this crop, and remaining area is in Bihar, Haryana, Punjab, Himachal Pradesh, Orissa and Karnataka, respectively (Anonymous, 2016-17a) ^[1, 2]. In Rajasthan, pea grown in 17004 ha with production of 47906 million tonnes and productivity 2.81 million t/ha. (Anonymous, 2016-17b) ^[1, 2]. Pea is cultivated for the fresh green seeds, tender green pods, dried seeds and foliage and cooked as a vegetable marketed fresh, canned and frozen. Dry pea are used as whole, split as dal, roasted, parched, boiled and made into flour (Davies *et al.*, 1985) ^[3]. The pea has a great agronomic value. In crop rotation, it helps improvement of soil fertility and yield of succeeding crops (Rana and Sharma, 1993) ^[6]. Field pea as potential ingredients for aquaculture feeds. In Europe and Canada pea is mainly used as livestock feed where as in America and Asia it is used as food of human beings (Duke, 1981) ^[4]. Peas are used as health conscious diets to promote general well being and reduce the risk of illness. They are excellent source of heart healthy food that may be beneficial to the prevention of cardiovascular disease. Oil from ripened seed has antisex harmonic effects, produce sterility and antagonizes effect of male hormone (Duke, 1981) ^[4]. Pea contains low amount of fat, low in sodium, cholesterol free, several minerals including iron, calcium, potassium and phosphorus. Mature seed contain (g/100g weight food) 10.9g water 22.9g protein, 1.4g fat, 60.7g carbohydrate, 1.4g fibre and 2.7g ash (Duke and Ayensu, 1985) ^[5]. Efficacy of different biocides was studied against powdery mildew of pea under field conditions. Results of pooled analysis revealed that minimum 19.75 per cent disease intensity was recorded in neem seed kernel extracts by decreasing 57.71 per cent disease intensity

Material & Methods

Field experiment was conducted for two consecutive years (2015-16 and 2016-17) during *rabi* season at Horticulture Farm, S.K.N. College of Agriculture, Jobner with susceptible cultivar Azad P-1 of pea was sown in 31st October in RBD with four replication.

Following plant extracts were used

S. No.	Plant extracts
1.	NSKE @ 5% two sprays at 15 days interval
2.	Sadabhar @ 5% two sprays at 15 days interval
3.	Datura leaves @ 5% two sprays at 15 days interval
4.	Tulsi leaves @ 5% two sprays at 15 days interval
5.	Ashawaganda @ 5% two spray at 15 days interval

Corresponding Author:**Manoj Kumar Meena**Department of Plant Pathology,
Sri Karan Narendra Agriculture
University, Jobner, Jaipur,
Rajasthan, India

For preparing phyto-extract of plant parts including seeds, leaves to be tested were first washed with tap water followed by sterilized distilled water and then air-dried. Weighed plant material was crushed in warring blender using 1:1 w/v, amount of distilled water using 100g of leaves and seed separately (Sindhani *et al.* 1999) ^[13], and filtered through double layered muslin cloth. This was considered as 100 per cent concentration and used for dilution to make needed

dilution. The plant extracts were diluted with water in 5 per cent concentration separately and sprayed on plants.

Foliar application of plant extracts were started just after disease initiation in the field and second spray was followed after 15 days of first spray. Per cent disease intensity was recorded after 15 days of second spray by examining 20 leaves from 10 randomly selected plants per plot. Seed yield was recorded in kg/ha at the harvest.

Table 1: Effect of biocides on powdery mildew disease intensity and pod yield of pea

Biocides	Concentration (%)	Per cent disease intensity			Decrease in PDI over control (%)	Pod yield (q/ha)			Increase in pod yield over control (%)
		2015-16	2016-17	Pooled		2015-16	2016-17	Pooled	
Neem seed kernel extract	0.5	17.43	22.07	19.75	57.71	90.52	85.47	88.00	47.87
		(24.68)	(28.02)	(26.39)					
Tulsi leaves	0.5	19.70	21.33	20.52	56.08	85.34	81.33	83.34	40.04
		(26.35)	(27.51)	(26.93)					
Datura leaves	0.5	21.11	23.34	22.23	52.41	81.24	78.41	79.83	34.14
		(27.35)	(28.89)	(28.13)					
Ashawagandha	0.5	23.34	25.23	24.29	48.00	78.54	74.15	76.35	28.29
		(28.89)	(30.15)	(29.52)					
Sadhabahar	0.5	26.88	29.10	27.99	40.07	70.22	65.26	67.74	13.83
		(31.23)	(32.65)	(31.94)					
Control	-	45.30	48.11	46.71	-	60.28	58.74	59.51	
		(42.30)	(43.92)	(43.11)					
SEm _±		0.76	0.74	0.75		2.21	2.11	2.16	
CD (p=0.05)		2.29	2.23	2.26		6.67	6.35	6.51	
CV		5.04	4.65	4.85		5.70	5.70	5.70	

*Average of four replications

Figures in parentheses are angular transformed values

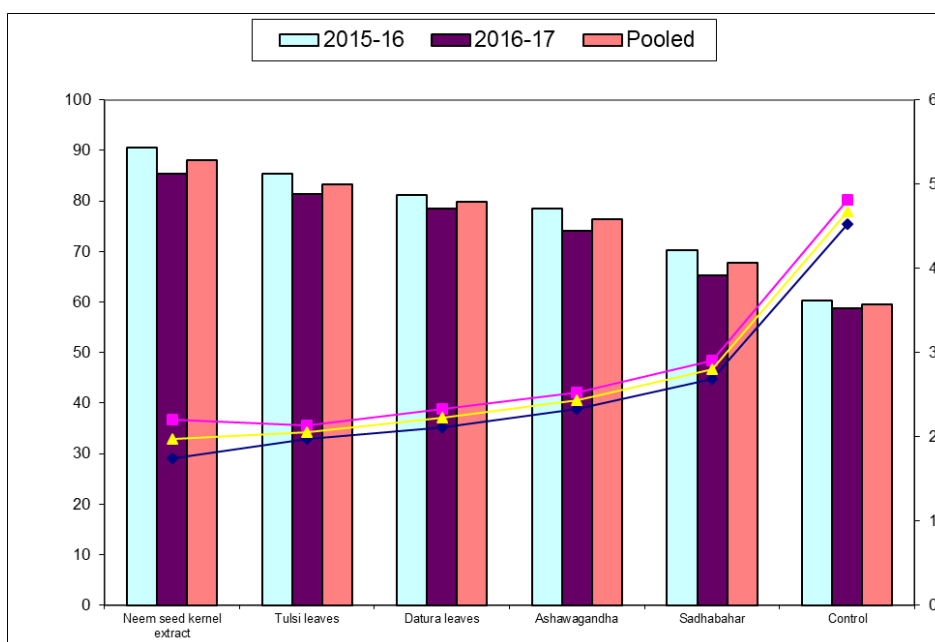


Fig 1: Effect of biocides on powdery mildew disease intensity and pod yield of pea

Result & Discussion

Efficacy of different biocides was studied against powdery mildew of pea under field conditions. Results of pooled analysis revealed that minimum 19.75 per cent disease intensity was recorded in neem seed kernel extracts by decreasing 57.71 per cent disease intensity.

In biocides treatment Tulsi leaves, Datura leaves, Ashawagandha and Sadhabahar was observed effective and exhibited 20.52, 22.23, 24.29 and 27.99 per cent disease intensity with decreasing 56.08, 52.41, 48.00 and 40.07 per cent disease intensity as compared to control with 46.71 per cent disease intensity

Two year pooled data of seed yield (Table 1) indicated that highest 88.00 q/ha pod yield was recorded in neem seed kernel extract. Seed yield of Tulsi leaves (83.34 q/ha), Datura leaves (79.83 q/ha), Ashawagandha (76.35 q/ha) and Sadhabahar (67.74 q/ha) sprayed plants were found lowest to other treatments. Pod yield 59.51 q/ha was found in control sprayed plants.

Out of five biocides, minimum 19.75 per cent disease intensity and highest 80.00 q/ha pod yield was recorded with neem seed kernel extract spraying plants and it was at par with tulsi leaves extract recorded 20.52 per cent disease intensity and 83.34 q/ha pod yield.

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