



Eco-friendly Management of Powdery Mildew of Pea (*Pisum sativum* L.)

Dinesh Kumar Meena ^a, Jitendra Singh ^a,
Waghmare Minal Bhujangrao ^{b*}
and Pankaj Kumar Sharma ^a

^a Department of Plant Pathology, SKN College of Agriculture, SKNAU, Jobner, India.

^b Department of Plant Pathology, Uttar Banga Krishi Viswavidyalya, Pundibari, Coochbehar, West Bengal, 736165, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: <https://doi.org/10.9734/jabb/2024/v27i101492>

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/124219>

Original Research Article

Received: 30/07/2024

Accepted: 01/10/2024

Published: 02/10/2024

ABSTRACT

Pea (*Pisum sativum* L.) is an important crop grown all over the world, in India commonly known as "Matar". India is ranked second in both area and production of pea globally. Erysiphe polygoni DC causes powdery mildew in pea, it is a one of most devastating disease. An experiment was conducted at the SKNCOA farm in Jobner during the Rabi season of 2021. Six natural products, including Panchgavya (10%), Butter milk (10%), Neem seed kernel extract (NSKE 10%), Duranta (10%), Parthenium (10%), and Mehandi (10%), were used as two foliar sprays. During the assessment, all treatments were shown to be effective against powdery mildew of pea, although Neem Seed Kernel Extract (NSKE 10%) and Panchgavya (10%) were determined to be the best treatments for controlling powdery mildew disease in pea.

*Corresponding author: E-mail: minalwaghmare2020@gmail.com;

Cite as: Meena, Dinesh Kumar, Jitendra Singh, Waghmare Minal Bhujangrao, and Pankaj Kumar Sharma. 2024. "Eco-Friendly Management of Powdery Mildew of Pea (*Pisum Sativum* L.)." *Journal of Advances in Biology & Biotechnology* 27 (10):703-7. <https://doi.org/10.9734/jabb/2024/v27i101492>.

Keywords: Pea; *Erysiphe polygoni*; panchagavya; neem seed kernel extract (NSKE); per cent disease intensity.

1. INTRODUCTION

Pea (*Pisum sativum* L.) is an important legume vegetable crop belongs to the Leguminosae family [1]. Peas are a significant human dietary item, supplying protein, carbs, and fibres. Various abiotic and biotic stresses reduce the profitability of pea for farmers by decreasing yield. India is ranking second next to China both in terms of area and production [2]. In 2017-18, the country produced 540,000 hectares of Garden Peas with a yield of 5422.01 mt/ha. respectively, which accounted for 21% of global production [2]. Uttar Pradesh, Bihar, Haryana, Punjab, Himachal Pradesh, Orissa, and Karnataka are India's top pea producing states [2].

Green peas are nutrient-dense and a great source of vitamins, minerals, and easily digested protein (7.2%) and carbohydrates (15.77%). Having a high protein content (27%), it plays a significant role in a vegetarian diet [3]. A significant amount of peas is prepared for consumption during the off-season by canning, freezing, or dehydrating. It also improves the soil because it is a leguminous crop and fixes atmospheric nitrogen into the soil [3].

Pea is a rabi season crop and its favourable temperature is 21 to 28°C for growth and production [4]. Downy mildew, Powdery mildew, Pea rust, Ascochyta blight, White rot are disease attacked on pea crop. Among these diseases powdery mildew (*Erysiphe polygoni* DC) is most damaging disease that can result in 25-50 percent yield losses [5]. Major symptoms of powdery mildew disease are the presence of white 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 it is the air borne disease, it reduces 24-27% pod weight, 21-30% pod number and up to 50% reduction in total yield loss [5].

2. MATERIALS AND METHODS

A field experiment was conducted in the Rabi season of 2021 at Plant Pathology's field number 7 at S.K.N. College of Agriculture, Jobner. Three replications of a local cultivar of pea were planted in RBD during the last week of November.

2.1 Preparation of Panchagavya

Five fresh cow products—cow dung (3 kg), cow urine (3 L), cow milk (2 L), cow curd (2 kg), and cow ghee (1 kg)—were combined to make panchagavya. Mix the fresh cow dung and cow ghee well, then incubated for two days. Added urine + 5 litre of water and stirred properly (daily in the morning and evening for a week) [6] together with cow milk and cow curd, and well mixed (daily for two weeks, in the morning and evening) Panchagavya is ready to use [7].

2.2 Preparation of Neem Seed Kernel Extract (NSKE)

The versatile native Indian tree known as neem (*Azadirachta indica*) [9]. Indian farmers have known about the neem tree's insecticidal qualities for thousands of years [10]. For preparing NSKE of plant parts

Table 1. List of natural products used *In vivo*

Treatment	Natural products	Concentration (%)
T ₁	Panchgavya	10.0
T ₂	Butter milk	10.0
T ₃	NSKE	10.0
T ₄	Duranta	10.0
T ₅	Parthenium	10.0
T ₆	Mehndi (<i>Lawsonia inermis</i>)	10.0
T ₇	Control(Water)	-

Table 2. Disease rating scale for powdery mildew disease of pea

Rating scale	Description	Disease reaction
0	No symptoms on leaves	Highly resistant
1	1-10% area of leaves infected	Resistant
2	11-25% area of leaves infected	Moderately resistant
3	26-50% area of leaves infected	Moderately susceptible
4	51-75% area of leaves infected	Susceptible
5	More than 75% area of leaves infected	Highly susceptible

Source: [8]

seeds to be tested were first washed with tap water followed by sterilized distilled water and then air-dried. The plant material that had been weighed was crushed using a warring blender at a ratio of 1:1 w/v, added distilled water using 100g of seed, and then filtered through two layers of muslin fabric. This was utilized to provide the necessary dilution and was regarded as a 100% concentration. Plants were treated with diluted neem seed kernel extract in 10 and 20 per cent concentration separately and sprayed on plants [11].

2.3 Application of Natural Products

Two foliar applications of natural products, first at 45DAS (before disease appearance) and second

at 75DAS (after disease appearance) under field condition. Per cent disease intensity was recorded after 15 days of second spray by examining 20 leaves from 10 randomly selected plants in field.

$$\text{Per cent disease intensity (PDI)} = \frac{\text{Sum of all the disease ratings} \times 100}{\text{Total number of ratings} \times \text{maximum disease grade}} [12].$$

3. RESULTS

Results analysis observed that minimum 22.73 per cent disease intensity was recorded in neem seed kernel extracts by decreasing 62.38 per cent disease intensity. And next best noted panchgavya with 25.68 per cent disease intensity by decreasing 57.50 per cent disease intensity over control.

Table 3. Effect of natural products on powdery mildew of pea under natural field condition

Treatment	Natural product	Concentration (%)	*PDI	Percent disease control
T ₁	Panchgavya	10	25.68 (30.45)	57.50
T ₂	Butter milk	10	35.05 (36.30)	41.99
T ₃	Neem seed kernel extract	10	22.73 (28.41)	62.38
T ₄	Duranta	10	32.49 (34.75)	46.23
T ₅	Parthenium	10	37.47 (37.74)	37.98
T ₆	Mehandi (<i>Lawsonia inermis</i>)	10	39.78 (39.10)	34.16
T ₇	Control (Water)	-	60.42 (51.01)	0.00
	Sem±		0.54	
	CD (=0.05)		1.66	

*Average of three replication

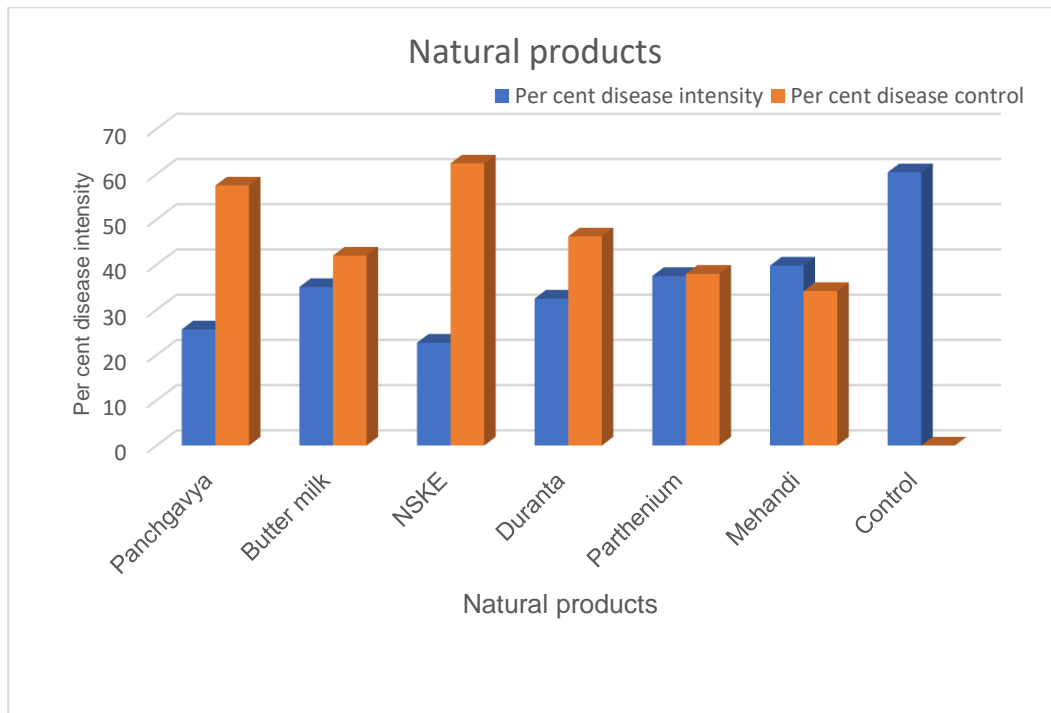


Fig. 1. Graphical representation of natural product and percent disease intensity

Duranta, butter milk, and parthenium with 32.49, 35.05 and 37.47 per cent disease intensity by decreasing 46.23, 41.99 and 37.98 per cent disease intensity over control respectively. Maximum disease intensity was observed of mehandi (*Lawsonia inermis*) with 39.78 per cent disease intensity over control.

4. CONCLUSION

From present study, it was concluded that out of six natural products, 10% concentration of neem seed kernel extract was extremely successful and Panchgavya 10% concentration reported as second-best treatment for controlling pea powdery mildew disease.

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 writing or editing of this manuscript.

ACKNOWLEDGEMENTS

The authors are thankful to Department of Plant Pathology, SKN College of Agriculture, SKNAU, Jobner for providing the necessary facilities during investigation.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Tulbek MC, Lam RSH, Asavajaru P, Lam A. Pea A sustainable vegetable protein crop. Sustainable Protein Sources. Academic Press. 2017;145–164.
2. NHB. Indian Horticultural Database. 2018. National Hort. Board, Guregaon, India; 2018.
3. Singh J, Chaudhary DR, Kumar S. Effect of post-emergence herbicides on productivity and profitability of garden pea (*Pisum sativum* L.) in Lahaul valley of Himachal Pradesh. Indian J. Agric. Sci. 2015;41(2):172–176.
4. Belanger RR, Labbe C. Control of powdery mildew without chemicals: Prophylactic and biological alternatives for horticultural crops. The powdery mildew: A comprehensive treatise. 2002;256-267.
5. Pramod P, Dwivedi SN. Fungicidal management of field pea (*Pisum sativum* L.) powdery mildew caused by *Erysiphe polygoni* DC. Progressive Research. 2007;2(1/2):116-118.

6. Raja J, Kurucheva V. Fungicidal activity of buffalo (*Babulus bubalis*) urine: A new record. Madras Agricultural Journal. 1999;86(10,12): 614-616.
7. Chadha S, Rameshwar A, Saini JP, Paul YS. Sustainable livelihood option for small and marginal farmers. Indian Journal of Traditional Knowledge Vedic Krishi. 2012; 11(3):480-482.
8. McKinney HH. A new system of grading of plant disease management. Journal of Agriculture Research. 1923;26:195-218.
9. Maurya S, Singh DP, Srivastava JS, Singh UP. Effect of some plant extracts on pea powdery mildew (*Erysiphe polygoni*). Ann. Pl. Protec. Sci. 2004;12(2):296-300
10. Rethinassababady C, Ramadoss N, Thirumeni S. Effect of plant extract in the control of powdery mildew of black gram (*Erysiphe polygoni* DC). Agricultural Science Digest. 2000;20(3):193-194.
11. Sindhan GS, Hooda I, Parashar RD. Evaluation of plant extract for the control of powdery mildew of pea. Journal of Mycology and Plant Pathology. 1999; 29(2):257-25.
12. Patil N B, Zacharia S, Kumari M. Eco-friendly management of powdery mildew of garden pea (*Pisum sativum* L.). Int. J. Curr. Microbiol. Appl. Sci. 2017;6:684-689.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of the publisher and/or the editor(s). This publisher and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.

© Copyright (2024): Author(s). The licensee is the journal publisher. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

The peer review history for this paper can be accessed here:

<https://www.sdiarticle5.com/review-history/124219>