

Efficacy of Jeevamrut Against Cercospora Leaf Spot of Spinach (*Spinacia oleracea* L.) In Pot Condition

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Abstract

Leaf spot of spinach caused by sp. is foliar disease and found to be present in different growth stages of the crop. In view to check the increasing pesticidal hazards and also, as under natural farming it is mandatory to use the on farm inputs and to avoid the use of off farm inputs. So, there was a strong need felt to evaluate the efficacy of Jeevamrut as there is lack of scientific evidence in support of this aspect, one ITK-Jeevamrut was chosen for development of effective management strategy of the disease. Jeevamrut at three different concentrations, Jeevamrut-1, Jeevamrut-2, Jeevamrut-3 and constituents of Jeevamrut viz., cow dung (2.5 and 7.5 percent), cow urine (2.5 and 7.5 percent), chickpea flour (1 %) and jaggery (1 %) were assessed against in pot condition by spray applications for management of this disease. Out of different organic inputs evaluated as spray applications for management of Cercospora leaf spot of spinach, foliar spray of Jeevamrut-2 was found effective to manage the disease with 73.69 PEDC followed by Jeevamrut-1 with PEDC 67.17 percent.

Keywords: Spinach; Jeevamrut; Management.

INTRODUCTION

Spinach (L.) an important leafy vegetable, belonging to family Amaranthaceae has originated from South West Asia (Damania 1998). It was a healthiest vegetable in the human diet due to its high concentration of nutrients and health promoting compounds (Dicoteau, 2000; Morelock and Correll, 2008). Spinach among green leafy vegetables is known for its anti-mutagenic and anti-microbial properties (Vazquez 2013). The spinach leaves have

protective action against certain cancers and cardio vascular diseases (Kaur and Kapoor, 2002).

Spinach crop suffers from various fungal diseases. Cercospora leaf spot disease caused by Sacc. has become very serious now-a-days. In Gujarat, during favourable environmental conditions especially at reproductive stage of the crop is attacked from its early to maturity stage by this disease resulting in severe leaf spotting, yellowing and pre-mature withering of the plant which is a major constraint in its successful cultivation (Bashir, 2017). The

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protocols of various Indigenous Technology Knowledge (ITKs) are crude as farmers practice traditional preparations without a proper scientific standardization. It is well recognized that the introduction of standardized ITKs have contributed a lot for development of farmers through judicious utilization of resources and supplementation of the benefits derived through them. Apart from using conventional farm based products there is an increasing demand for improvised liquid organic formulations such as jeevamrut, beejamrut and panchgavya. Jeevamrut is a low cost improvised preparation that enriches the soil with indigenous micro organisms required for mineralization of the soil (Gore and Sreenivasa, 2011).

To manage the disease through natural farming inputs, the present study need to carried out to evaluate the efficacy of Jeevamrut against Cercospora leaf spot of spinach. The present study may explore new path to manage disease naturally and it may reduces the usage of pesticides.

METHODS

The infected leaves were first examined for associated fungus by teasing the afflicted area with a teasing needle and observed it under a microscope. For isolation of the fungus, small segments of diseased leaf tissue (5 mm²) along with some healthy portion were cut, surface sterilized and placed on to the petri plates containing V8- juice agar medium and incubated at 27±2°C for 30 days. The culture was purified by single spore isolation (Johnston and Booth, 1983)

Preparation of Jeevamrut Solutions

i. Solution: 1 (Jeevamrut-1):

It was prepared by taking 125 g fresh cow dung, 375 ml cow urine (old), 50 g black jaggery, 50 g chickpea flour and 2.5 g live soil mixed with 5 liter of water. Solution was kept for 2-7 days in shade for fermentation. During fermentation, the solution was stirred daily. The lid of the container should be kept loose. After which it was used for spraying.

ii. Solution: 2 (Jeevamrut-2):

It was prepared by taking 250g fresh cow dung, 250 ml cow urine (old), 50g black jaggery, 50g chickpea flour and 2.5 g live soil mixed with 5 liter of water. Solution was kept for 2-7 days in shade for fermentation. During fermentation, the solution was stirred daily. The lid of the container should be kept loose. After which it was used for spraying.

iii. Solution: 3 (Jeevamrut-3):

It was prepared by taking 375 g fresh cow dung, 125 ml cow urine (old), 50 g black jaggery, 50 g chickpea flour and 2.5 g live soil mixed with 5 liter of water. Solution was kept for 2-7 days in shade for fermentation. During fermentation, the solution was stirred daily. The lid of the container should be kept loose. After which it was used for spraying.

iv. Solution: 4 (Fresh cow dung-2.5 %)

v. Solution: 5 (Fresh cow dung-7.5 %)

vi. Solution: 6 (Cow urine-2.5 %)

vii. Solution: 7 (Cow urine-7.5 %)

viii. Solution: 8 (Chickpea flour-1 %)

ix. Solution: 9 (Jaggery-1 %)

x. Solution: 10 (Untreated control)

Procedure:

Pot experiments were laid out in Completely Randomized Design (CRD) with three repetitions separately for each of the treatments to manage the disease on susceptible local spinach landrace in 2021 under the Net House condition, at Department of Horticulture, Collage of Agriculture, Bharuch. Spinach plants were raised in 30 cm earthen pots having sand, soil and FYM (3:1:1) mixture from organic field where organic farming is practiced for past six years. Three to four plants were maintained in each pot. Inoculations were made with a spore suspension of inoculum concentration of 1×10^5 conidia ml⁻¹ for spp on 50 days-old-plants. After 36 hours of inoculation of the pathogen, foliar applications of solutions of Jeevamrut-1, Jeevamrut-2 and Jeevamrut-3, cow dung, cow urine at 2.5 and 7.5 percent, chickpea flour and jaggery at 1.0 percent concentrations were made.

Observations of percent disease index were recorded after 7 days of inoculation on a standard disease rating scale (1-5 score) given in table 3.1 (Mayee and Datar, 1986).

The percent disease index (PDI) and percent efficacy of disease control (PEDC) were calculated by using following formula given by Wheeler, 1969:

$$\text{PDI (\%)} = \frac{\text{sum of individual disease rating}}{\text{total number of leaf observed} \times \text{Max. disease grade}} \times 100$$

$$\text{PEDC (\%)} = \frac{\text{PDI in control} - \text{PDI treatment}}{\text{PDI in control}} \times 100$$

RESULTS

All the treatments were found effective to manage Cercospora leaf spot of spinach and

suppress the disease over un-treated inoculated control. The maximum PDI 71.43 was observed in the un-treated inoculated control. The lowest disease with PDI 18.78 was recorded in foliar spray of Jeevamrut-2 solution, which was significantly superior as compared to all the other treatments (Plate-4.7) followed, by Jeevamrut-1 with PDI 23.45 and Jeevamrut-3 with PDI 27.78. Among the rest of other treatments, the significantly higher percent disease index for cow urine at 7.5 percent concentration (34.11 PDI) which was at par with

cow dung at 7.5 percent concentration (32.78 PDI), and cow urine at 2.5 percent concentration PDI was 38.45. PDI for cow dung @ 2.5 percent was 43.11. Chickpea flour (1%) and jaggery (1%) has least effect against with PDI 55.71 and 60.0, respectively (Table 6).

Overall minimum percent disease index (PDI) was found in foliar spray of Jeevamrut-2 with PDI 18.78 followed by Jeevamrut - 1 (23.45%). Among treatments, maximum PDI was found in case of jaggery (1%) with PDI 60.0.

Table 1: Effect of Jeevamrut and its components against Cercospora leaf spot of spinach under pot condition

Sr. No.	Treatments	Percent Disease Index (PDI)	Percent Efficacy of Disease Control (PEDC)*
1	Jeevamrut-1	23.45*	67.17*
2	Jeevamrut-2	18.78	73.69
3	Jeevamrut-3	27.78	61.05
4	Fresh cow dung-2.5%	43.11	39.59
5	Fresh cow dung-7.5%	32.78	54.10
6	Cow urine (old)-2.5%	38.45	46.08
7	Cow urine (old)-7.5%	34.11	52.25
8	Chickpea flour-1%	55.71	21.98
9	Jaggery-1%	60.00	15.99
10	Control	71.43	0.00
	S.E.m.±	0.55	0.68
	CD at 5%	1.71	2.12
	CV %	4.28	4.99

DISCUSSION

Spinach is one of the important leafy vegetable. Cercospora leaf spot disease is one of the most wide spread disease of spinach which is caused by Sacc. In view of the increasing severity of Cercospora leaf spot of spinach in South Gujarat. As spinach is an edible crop and large quantity of pesticides is being used on it, there is a growing demand for chemical pesticide free natural spinach production. Studies are needed to evaluate efficacy of jeevamrut against Cercospora leaf spot of spinach. The result revealed that Jeevamrut-2 was found the most effective against. Jeevamrut contain different beneficial microbial load for enhancing plant growth, yield and also for imparting disease resistance to plants by antagonistic microbial population. These microorganisms secrete proteins, organic acids and antioxidants in the presence of organic matter and convert them into energy thereby microflora

and fauna change a disease inducing to a disease suppressive phyllosphere. Hence, it was concluded that effectiveness of Jeevamrut against Cercospora leaf spot of spinach must be further evaluated under field conditions.

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