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# MANAGEMENT OF *CERCOSPORA* LEAF SPOT IN OKRA THROUGH ORGANIC INPUTS

**N.B. Pawar[1], Ranganathswamy Math[2*], Arjunsinh Rathava[2], H.C. Patel[3], M.R. Dabhi[4] and C.B. Varma[5]**

[1]Department of Plant Pathology, College of Agriculture A.A.U., Vaso, Gujarat – 393 041, India

[2]Department of Plant Pathology, College of Agriculture A.A.U., Jabugam, Gujarat – 391 155, India

[3]Assistant Professor, Department of Agricultural Entomology, B.A. College of Agriculture A.A.U., Anand, Gujarat – 388 110, India

[4]Assistant Professor, Department of Agricultural Entomology, College of Agriculture A.A.U., Jabugam, Gujarat – 391 155, India

[5]Assistant Professor, Department of Agricultural Entomology, College of Agriculture A.A.U., Vaso, Gujarat – 393 041, India

*Corresponding author's email ID: ranganath_pat@aau.in

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**ABSTRACT**

The aim of this study was to investigate the effects of different organic inputs on the management of *Cercospora* leaf spot in okra. The investigation was carried out for consecutive two years at two locations *i.e.,* experimental field of College of Agriculture, A.A.U., Jabugam and Vaso, Gujarat. The experiment was laid out in randomized block design (RBD ) with three replications and ten treatments. Organic inputs were applied three times at 15 days interval after initiation of disease and results showed that among the tested treatments including control, seed treatment of *Beejamrit* 200 ml/kg seed + three foliar sprays of *Panchagavya* @ 10% were found most effective in reducing cercospora leaf spot disease with highest fruit yield of okra.

***Keywords*** **:** *Cercospora*, leaf spot, panchagavya, beejamrut, jeevamrut, okra, cowurine.

## Introduction

Okra (*Abelmoschus esculentus* (L) Moench), a fruit vegetable crop that belongs to the Malvaceae family. It is an important vegetable crop of India and its distinguished cultivars are commercially grown in many parts of the world for its unique taste and nutritional value. India is the largest producer of okra globally, with a contribution of more than 72% (6 million tonnes) from an area of 0.5 million hectares (Anon., 2021). Gujarat is the leading producer followed by West Bengal, Bihar Madhya Pradesh and Orissa. In Gujarat, okra is cultivated over 91177 hectares with the production of 1098021 million tons (Anon., 2021).

Biotic and abiotic factors affect the okra yield and among biotic factors Insect pest and diseases are the major constraints for yield loss (Sastry and Singh, 1974). Damping off, Fusarium wilt, Powdery mildew, Cercospora leaf spot, Leaf curl virus and Bhendi Yellow Vein Mosaic virus are the important diseases affecting the crop. The total loss of vegetable on this regard is about to 20% to 30%, which may increase up to 80% to 90% (Hamer and Thompson, 1957). Two species of *Cercospora viz.*,*Cercospora malayensis* Stev. and Solh. and *C. abelmoschi* EII. and Ev. were found to be the cause of leaf spots in okra in India (Sridharan and Rangaswamy, 1968). These two species differ in production of symptoms, as *C. malayensis* causes brown, irregular spots while *C. abelmoschi* causes sooty black, angular spots. The affected leaves roll, wilt and fall. The leaf spots cause severe defoliation and are common during humid seasons.

Various approaches have been explored to manage the *Cercospora* leaf spot disease, however foliar spray with fungicides appears to be more

effective. Further, the overreliance on chemicals has resulted in the problem of resistance, creation of environmental pollution and human health risk hence use of bio-agents and organic inputs would help to minimize ill effects of fungicides use. Thus, the field experiment was carried out to evaluate the efficacy of organic inputs against *Cercospora* leaf spot disease of okra at two locations (Vaso & Jabugam).

## Materials and Methods

A field experiment was conducted to evaluate the efficacy of different fungicides against *Cercospora* leaf spot disease of okra under field conditions for two years (2020 & 2021) at experimental field of Agriculture Research Station, Jabugam and Vaso during *Kharif* season. Okra variety GAO-5 was sown and trial was laid out in a Randomized block design with 10 treatments and 3 replications (Fig. 1, Table 2). The organic inputs were prepared manually by using recommended compositions (Table 3). The first spray of organic inputs was given at the initiation of the disease and subsequently remaining sprays were given at 15 days interval. Disease intensity for *Cercospora* leaf spot was recorded at 10 days interval after first, second and third spray from 5 selected plants in each treatment (Fig 2). Six leaves *i.e.* 2 each from bottom, middle and top from each selected plant were observed and graded based on 0-9 scale given by Mayee and Datar (1986).

**Table 1 :** Disease rating scale for *Cercospora* leaf spot disease of okra

| Scale | Description |
|---|---|
| 0 | No symptoms on leaf |
| 1 | Up to 1% of leaf area covered by lesions |
| 3 | 1- 10% of leaf area covered by lesions |
| 5 | 11-25% of leaf area covered by lesions |
| 7 | 26-50% of leaf area covered by lesions |
| 9 | More than 50% of leaf area covered by lesions |

The Per cent disease intensity (PDI) was calculated by following formula described by Wheeler (1969).

$$PDI = \frac{\text{Sum of all numerical ratings}}{\text{No. of leaves observed} \times \text{Maximum rating scale}} \times 100$$

**Table 2 :** Different organic inputs and their concentrations

| Treat No. | Details |
|---|---|
| $T_1$ | Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes. |
| $T_2$ | $T_1$ + foliar spray of cow urine @ 5% |
| $T_3$ | $T_1$ + foliar spray of cow urine @ 10% |
| $T_4$ | $T_1$ + foliar spray of *Panchagavya* @ 5% |
| $T_5$ | $T_1$ + foliar spray of *Panchagavya* @ 10% |
| $T_6$ | $T_1$ + foliar spray of liquid *Jeevamrut* @ 5% |
| $T_7$ | $T_1$ + foliar spray of liquid *Jeevamrut* @ 10% |
| $T_8$ | $T_1$ + foliar spray of fermented buttermilk @ 5% |
| $T_9$ | $T_1$ + foliar spray of fermented buttermilk @ 10% |
| $T_{10}$ | Untreated check |

**Preparation and composition of various organic inputs:**

**(A) *Beejamrit*** ( for10 kg seed treatment)

| | |
|---|---|
| Cow dung : 500 g | Fresh cow urine: 500 ml |
| Lime: 10 g | Soil from underneath of Banyan tree: 100 g |
| Water: 2 litre | - |

**Method of preparation:** All the ingredients were added in 2 liter of water in bucket. After stirring, bucket was covered with gunny bag and kept for 24 hours. Mixture was sprayed on seeds which were dried under shade.

**(B) *Panchagavya***

| | |
|---|---|
| Fresh cow dung: 7 kg | Fresh cow urine: 10 litre |
| Cow milk: 3 litre | Cow curd: 2 litre |
| Cow ghee: 1 kg | Coconut water: 3 litre |
| Jaggery: 3 kg | Ripened banana: 12 no. |
| Water: 10 litre | |

**Method of preparation:** Cow dung 7.0 kg and ghee 1.0 kg were mixed in barrel and kept for 3 days by regular mixing twice a day. On Fourth day cow urine 10 litre and water 10 litre were added to the mixture and kept for 15 days by regular mixing twice a day. After 15 days remaining items *viz.,* cow milk 3.0 litre, cow ghee 1.0 kg, coconut water 3.0 litre, jaggery 3.0 kg and ripened banana 12 number were mixed and kept for 30 days by regular mixing twice a day.

**(C) *Jeevamrut***

| | |
|---|---|
| Fresh cow dung: 10 kg | Cow urine: 10 litre |
| Desi gud (*Jaggery*): 2 kg | Pulse flour: 1 kg |
| Soil from underneath of Banyan tree: 500 g | Water: 180 litre |

**Method of preparation**: 200 litre water was taken in a barrel and all the ingredients were mixed in it. Mixture was kept for 7 days by regular mixing twice a day.

**(D) Fermented buttermilk**: One litre of cow milk was taken and inoculated with curd culture and kept for overnight to ferment. Next day morning prepared curd was mixed with 9 litre of water and stirred well. The mixture was kept for fermentation for 5-10 days.

## Results and Discussion

All the tested organic inputs were effective in controlling *Cercospora* leaf spot in okra in the field during two consecutive years of study. The different tested organic inputs have differed in respect of disease intensity (%) and yield (kg/ha). In the first year (2020), treatment number –5 *i.e.* Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes and foliar spray of *Panchagavya* @ 10% recorded lowest disease intensity (21.80%) and it showed statistical parity with $T_4$ - Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes + foliar spray of *Panchagavya* @ 5%. The data on fruit yield revealed that all the treatments recorded higher fruit yield than control. The highest fruit yield (12253 kg/ha) was recorded in treatment $T_5$ which was at par with treatment $T_6$, $T_7$ and $T_4$ recorded 11227, 10554 & 10262 fruit yield kg/ha, respectively and minimum *i.e.,* 7257 kg/ha in untreated control treatment (Table 3).

In the second year (2021), treatment number –5 *i.e.,* Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes and foliar spray of *Panchagavya* @ 10% recorded lowest disease intensity of 18.95% and 20.35% at both the locations *viz.,* Jabugam and Vaso respectively. The data on fruit yield revealed that highest fruit yield was recorded in treatment number - 5 *i.e.* Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes and foliar spray of *Panchagavya* @ 10% at both the locations *viz.,* Jabugam (11887 kg/ha) and Vaso (10822 kg/ha).

The data on the pooled over sprays over years (Table 4) of evaluation organic inputs against *Cercospora* leaf spot disease of okra in the year 2020 and 2021 revealed that, the lowest percent disease intensity 20.37 % was recorded in treatment $T_5$ *i.e.* seed treatment with *Beejamrit* + foliar spray with Panchagavya @ 10% and was significantly superior over rest of treatments. The treatment $T_6$ (seed treatment with *Beejamrit* + foliar spray with liquid Jeevamrut @ 5%) and $T_4$ (seed treatment with *Beejamrit* + foliar spray with Panchagavya @ 5%) was found next superior to $T_5$ treatment recorded 23.58 and 23.65 % disease intensity respectively. However, the maximum percent disease intensity (34.24 %) was observed in untreated check treatment.

Among the different organic inputs evaluated the maximum fruit yield (12070 kg/ha) was recorded in treatment $T_5$, seed treatment with *Beejamrit* + foliar spray with Panchagavya @ 10% which was at par with treatment $T_6$ (seed treatment with *Beejamrit* + foliar spray with liquid Jeevamrut @ 5%) recorded 11339 kg/ha fruit yield and was significantly superior over rest of treatments (Table 4).

**Pooled over sprays and locations (Vaso & Jabugam)**

The data on the pooled over sprays over locations Vaso and Jabugam indicated in Table 6 revealed that, the lowest percent disease intensity 19.71 % was recorded in treatment $T_5$ *i.e.* seed treatment with *Beejamrit* + foliar spray with *Panchagavya* @ 10% and was significantly superior over rest of treatments. The treatment $T_4$ (seed treatment with *Beejamrit* + foliar spray with *Panchagavya* @ 5%) and $T_6$ (seed treatment with *Beejamrit* + foliar spray with liquid Jeevamrut @ 5%) was found next superior to $T_5$ treatment recorded 23.32 and 23.47 % disease intensity respectively. However, the significant maximum percent disease intensity (33.75 %) was observed in untreated check treatment.

Among the different organic inputs evaluated the maximum fruit yield (11354 kg/ha) was recorded in treatment $T_5$ (seed treatment with *Beejamrit* + foliar spray with *Panchagavya* @ 10%) which was at par with treatment $T_7$ (seed treatment with *Beejamrit* + foliar spray with liquid Jeevamrut @ 10%), $T_6$ (seed treatment with *Beejamrit* + foliar spray with liquid Jeevamrut @ 5%), and $T_4$ (seed treatment with *Beejamrit* + foliar spray with *Panchagavya* @ 5%) recorded 10507, 10385 and 10381 kg/ha fruit yield, respectively. However, minimum fruit yield (7629 kg/ha) was recorded in untreated check treatment and was at par (8038 kg/ha) with treatment $T_1$ (seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes) (Table 4).

**Economics :** The treatment $T_5$ (seed treatment with *Beejamrit* + foliar spray with *Panchagavya* @ 10%) registered the highest (1:15.36) ICBR followed by treatment $T_1$ seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes (1:14.24), treatment $T_7$ seed treatment with *Beejamrit* + foliar spray with liquid Jeevamrut @ 10% (1:12.33), $T_6$ seed treatment with *Beejamrit* + foliar spray with liquid Jeevamrut @ 5% (1:12.09) (Table 5).

Several researchers reported the effectiveness of organic inputs against various plant pathogens (Mishra, 2018; Chatak and Banyal, 2020; Gurjar *et al.,* 2021; Singh *et al.,* 2022; Jaina & Gohel, 2023; Patel & Ranganathswamy, 2024). Mishra (2018) reported that seed treatment followed by foliar spray *panchgavya* minimized the disease intensity (15.55 to 22.02%) over the control. Three sprays of panchgavya (@10%) at ten days interval gave maximum disease control of 33.64 per cent with 26.14 per cent yield increase (Chatak and Banyal, 2020). Jaina & Gohel (2023) found soaking

tubers in *Beejamrutha* (5 lit/10 kg tubers) for 30 min and two foliar sprays of *Jeevamrutha* @ 5% was most effective in control of potato early blight under field conditions.

## Conclusion

Among all the treatments evaluated against *cercospora* leaf spot disease of okra, seed treatment of *Beejamrit* 200 ml/kg seed + three foliar sprays of *Panchagavya* @ 10% was most effective in reducing *cercospora* leaf spot disease with highest fruit yield of okra.

### Conflict of interest

The research findings in this article do not have any conflict of interest.

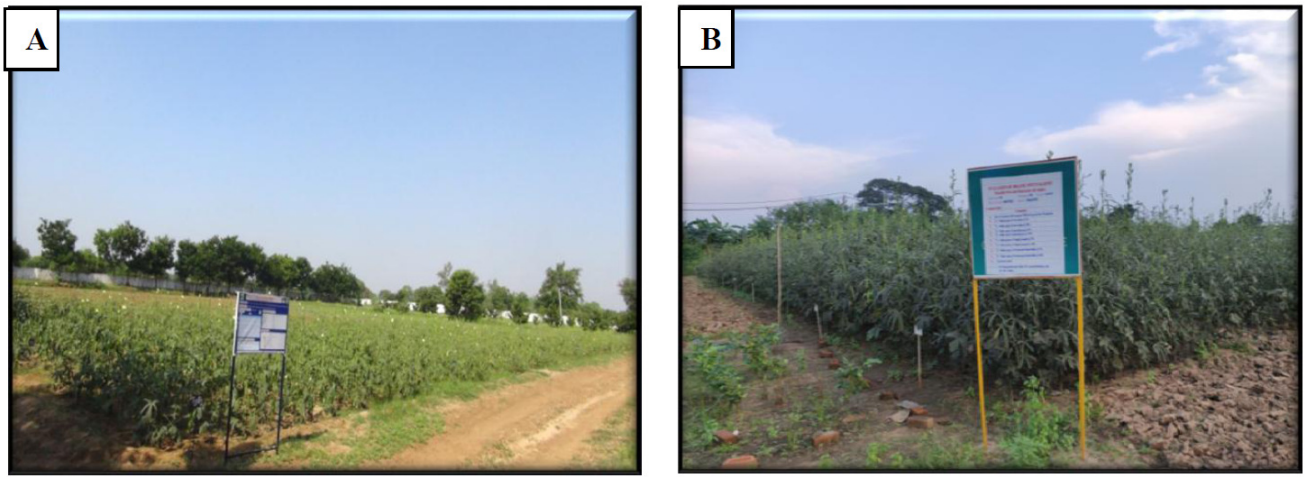


**Fig. 1:** General View of Experimental layout: **A.** Vaso location, **B.** Jabugam location

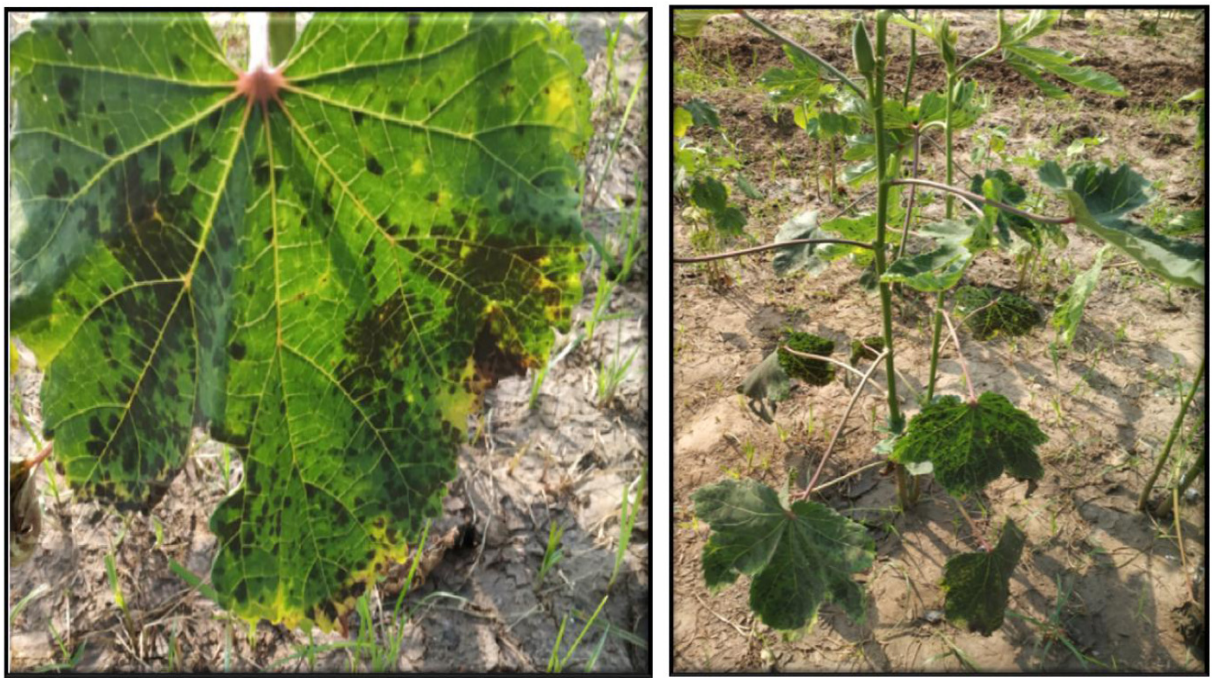

**Fig. 2 :** Symptoms of *Cercopsora* leaf spot in okra

**Table 3:** Evaluation of different organic inputs against *Cercospora* leaf spot disease of okra at location Jabugam

| Tr. No. | Treatment details | 2020 | | 2021 | | Pooled | | |
|---|---|---|---|---|---|---|---|---|
| | | Disease intensity (PDI) | Yield (kg/ha) | Disease intensity (PDI) | Yield (kg/ha) | Disease intensity (PDI) | Yield (kg/ha) | Yield increased over control |
| $T_1$ | Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes. | 33.57$^{ab}$ (31.25) | 78356$^{de}$ | 32.75$^{ab}$ (29.85) | 8391$^{de}$ | 33.16$^{b}$ (30.55) | 8113$^{f}$ | 5.84 |
| $T_2$ | $T_1$ + foliar spray of cow urine @ 5% | 30.73 $^{cd}$ (26.57) | 9186$^{cd}$ | 31.48$^{cd}$ (27.65) | 9468$^{cd}$ | 31.10$^{cd}$ (27.11) | 9327$^{e}$ | 18.09 |
| $T_3$ | $T_1$ + foliar spray of cow urine @ 10% | 29.61$^{de}$ (24.84) | 9726$^{bcd}$ | 31.09$^{de}$ (27.04) | 9965$^{bc}$ | 30.35$^{cd}$ (25.94) | 9846$^{cde}$ | 22.41 |
| $T_4$ | $T_1$ + foliar spray of *Panchagavya* @ 5% | 28.57$^{ef}$ (23.23) | 10544$^{abc}$ | 29.07$^{ef}$ (24.07) | 10995$^{ab}$ | 28.82$^{e}$ (23.65) | 10770$^{bc}$ | 29.07 |
| $T_5$ | $T_1$ + foliar spray of *Panchagavya* @ 10% | 27.69$^{f}$ (21.80) | 12253$^{a}$ | 25.51$^{f}$ (18.95) | 11887$^{a}$ | 26.60$^{f}$ (20.37) | 12070$^{a}$ | 36.71 |
| $T_6$ | $T_1$ + foliar spray of liquid *Jeevamrut* @ 5% | 29.41$^{def}$ (24.47) | 11227$^{ab}$ | 28.24$^{def}$ (22.69) | 11451$^{a}$ | 28.83$^{e}$ (23.58) | 11339$^{ab}$ | 32.63 |
| $T_7$ | $T_1$ + foliar spray of liquid *Jeevamrut* @ 10% | 29.46$^{def}$ (24.37) | 10262$^{abc}$ | 30.03$^{def}$ (25.39) | 10737$^{abc}$ | 29.75$^{de}$ (24.88) | 10500$^{bcd}$ | 27.24 |
| $T_8$ | $T_1$ + foliar spray of fermented buttermilk @ 5% | 32.5$^{bc}$ (29.16) | 9549$^{bcd}$ | 30.72$^{bc}$ (26.57) | 9398$^{cd}$ | 31.61$^{c}$ (27.86) | 9473$^{de}$ | 19.36 |
| $T_9$ | $T_1$ + foliar spray of fermented buttermilk @ 10% | 32.17$^{bc}$ (28.56) | 9680$^{bcd}$ | 31.15$^{bc}$ (27.33) | 9861$^{bc}$ | 31.66$^{bc}$ (27.94) | 9770$^{cde}$ | 21.81 |
| $T_{10}$ | Control | 35.31$^{a}$ (33.93) | 7257$^{e}$ | 35.78$^{a}$ (34.55) | 8021$^{e}$ | 35.54$^{a}$ (34.24) | 7639$^{f}$ | - |
| S.Em.± | | 0.61 | 587 | 0.72 | 424 | 0.47 | 332.45 | |
| CD at 5% | | S | S | S | S | S | S | |
| C.V. (%) | | 5.93 | 10.43 | 7.08 | 7.34 | 6.52 | 8.98 | |

**Note**: *Figures in parentheses are original values and those outside are arc sine transformed values.
Treatment means with the letter(s) in common are not significant by DNMRT at 5% level of significance, **S:** Significant**, NS**: Non-significant

**Table 4:** Evaluation of different organic inputs against *Cercospora* leaf spot disease of okra (Pooled over locations; Vaso & Jabugam during 2021)

| Tr. No. | Treatment details | Vaso | | Jabugam | | Pooled | | |
|---|---|---|---|---|---|---|---|---|
| | | Disease intensity (PDI) | Yield (kg/ha) | Disease intensity (PDI) | Yield (kg/ha) | Disease intensity (PDI) | Yield (kg/ha) | Yield increased over control |
| **$T_1$** | Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 minutes. | 32.47$^{ab}$ (29.35) | 7685$^{cd}$ | 32.75$^{ab}$ (29.85) | 8391$^{de}$ | 32.61$^{b}$ (29.62) | 8038$^{de}$ | 5.08 |
| **$T_2$** | $T_1$ + foliar spray of cow urine @ 5% | 30.08$^{bc}$ (25.69) | 8897$^{abcd}$ | 31.48$^{cd}$ (27.65) | 9468$^{cd}$ | 30.78$^{bc}$ (26.71) | 9182$^{c}$ | 16.91 |
| $T_3$ | $T_1$ + foliar spray of cow urine @ 10% | 28.74$^{cd}$ (23.68) | 9109$^{abcd}$ | 31.09$^{de}$ (27.04) | 9965$^{bc}$ | 29.92$^{cd}$ (25.38) | 9537$^{bc}$ | 20.00 |
| $T_4$ | $T_1$ + foliar spray of *Panchagavya* @ 5% | 28.00$^{cd}$ (22.53) | 9768$^{abc}$ | 29.07$^{ef}$ (24.07) | 10995$^{ab}$ | 28.53$^{d}$ (23.32) | 10381$^{ab}$ | 26.50 |
| $T_5$ | $T_1$ + foliar spray of *Panchagavya* @ 10% | 26.53$^{d}$ (20.35) | 10822$^{a}$ | 25.51$^{f}$ (18.95) | 11887$^{a}$ | 26.02$^{e}$ (19.71) | 11354$^{a}$ | 32.80 |
| $T_6$ | $T_1$ + foliar spray of liquid *Jeevamrut* @ 5% | 29.21$^{cd}$ (24.21) | 9321$^{abc}$ | 28.24$^{def}$ (22.69) | 11451$^{a}$ | 28.72$^{d}$ (23.47) | 10385$^{ab}$ | 26.53 |
| $T_7$ | $T_1$ + foliar spray of liquid *Jeevamrut* @ 10% | 28.21$^{cd}$ (22.65) | 10278$^{ab}$ | 30.03$^{def}$ (25.39) | 10737$^{abc}$ | 29.13$^{cd}$ (24.06) | 10507$^{ab}$ | 27.39 |
| $T_8$ | $T_1$ + foliar spray of fermented buttermilk @ 5% | 30.07$^{bc}$ (25.61) | 8657$^{bcd}$ | 30.72$^{bc}$ (26.57) | 9398$^{cd}$ | 30.40$^{cd}$ (26.10) | 9027$^{cd}$ | 15.48 |
| $T_9$ | $T_1$ + foliar spray of fermented buttermilk @ 10% | 28.84$^{cd}$ (23.72) | 9024$^{abcd}$ | 31.15$^{bc}$ (27.33) | 9861$^{bc}$ | 29.99$^{cd}$ (25.54) | 9442$^{bc}$ | 19.20 |
| $T_{10}$ | Control | 34.65$^{a}$ (32.93) | 7238$^{d}$ | 35.78$^{a}$ (34.55) | 8021$^{e}$ | 35.22$^{a}$ (33.75) | 7629$^{e}$ | - |
| S.Em.± | | 0.89 | 619 | 0.72 | 424 | 0.59 | 352 | |
| CD at 5% | | S | S | S | S | S | S | |
| C.V. (%) | | 9.43 | 11.81 | 7.08 | 7.34 | 8.32 | 9.63 | |

**Note**: *Figures in parentheses are original values and those outside are arc sine transformed values.
Treatment means with the letter(s) in common are not significant by DNMRT at 5% level of significance **S:** Significant**, NS**: Non-significant

**Table 5:** Economics of different organic inputs evaluated against the *Cercospora* leaf spot disease of okra

| Tr. No. | Organic input | Quantity of Organic input req. for 3 sprays (lit/ha) | Price of organic input (Rs./lit) | Cost of organic input (Rs./ha) | Labour cost (Rs./ha) | Total Cost of plant protection (Rs./ha) | Yield (kg/ha) | Net gain over control (kg/ha) | Realization (Rs./ha) | ICBR |
|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ | Seed treatment with *Beejamrit* 200 ml/ kg seed for 30 min. | 2 | 1.00 | 2 | 617 | 619 | 8038 | 409 | 8180 | 1:14.21 |
| $T_2$ | $T_1$ + foliar spray of cow urine, 5% | 2 +75 | 1.00 + 1.00 | 77 | 4319 | 4396 | 9182 | 1553 | 31060 | 1:8.07 |
| $T_3$ | $T_1$ + foliar spray of cow urine, 10% | 2 +150 | 1.00+ 1.00 | 152 | 4319 | 4471 | 9537 | 1908 | 38160 | 1:9.54 |
| $T_4$ | $T_1$ + foliar spray of *Panchagavya*, 5% | 2 +75 | 1.00 + 2.20 | 167 | 4855 | 5022 | 10381 | 2752 | 55040 | 1:11.96 |
| $T_5$ | $T_1$ + foliar spray of *Panchagavya*, 10% | 2 +150 | 1.00 + 2.20 | 332 | 4855 | 5187 | 11354 | 3725 | 74500 | 1:15.36 |
| $T_6$ | $T_1$ + foliar spray of liquid *Jeevamrut*, 5% | 2 +75 | 1.00 +1.50 | 115 | 4855 | 4970 | 10385 | 2756 | 55120 | 1:12.09 |
| $T_7$ | $T_1$ + foliar spray of liquid *Jeevamrut*, 10% | 2 +150 | 1.00 +1.50 | 227 | 4855 | 5082 | 10507 | 2878 | 57560 | 1:12.33 |
| $T_8$ | $T_1$ + foliar spray of fermented buttermilk, 5% | 2 +75 | 1.00+ 20 | 1502 | 4319 | 5821 | 9027 | 1398 | 27960 | 1:5.80 |
| $T_9$ | $T_1$ + foliar spray of fermented buttermilk, 10% | 2 +150 | 1.00+ 20 | 3002 | 4319 | 7321 | 9442 | 1813 | 36260 | 1:5.95 |
| $T_{10}$ | Untreated check | - | - | | - | - | 7629 | 0000 | - | - |

**Note:** 1. Labour charges: Rs. 349/ day x 2 Labour = Rs.698/ha and Rs. 268/ day x 2 labour = Rs. 536 /ha. 698+536=1234. 1234 x 3 spray= 3702

2. Treatment no. 1 required only one skilled & one unskilled labour for preparation of *Beejamrit* & seed treatment.
3. Treatment no. 4, 5, 6 and 7 required additional two unskilled labour for preparation of *Panchagavya* and *Jeevamrut*.
4. Market price of okra: Rs.20/kg

## References


Anonymous (2021). *Annual Report Department of Agriculture and Farmers welfare*, GOI, pp.1-263.

Bhardwaj, C. L. and Thakur D.R. (1991). Efficacy and economics of fungicide spray schedules for control of leaf spots and pod blights in urdbean. *Indian Phytopathology.* **44** (4): 470-475.

Chatak, S. and Banyal D. K. (2020). Evaluation of IDM components for the management of urdbean anthracnose caused by *Colletotrichum truncatum* (Schwein) Andrus and Moore. *Himachal Journal of Agricultural Research,* **46** (2) : 156-162.

Gurjar, A.K., Bunker R.N and Sharma A. K. (2021). Efficacy of fungicides, botanicals and organic amendments to suppress the anthracnose of soybean caused by *Colletotrichum truncatum* (Schw.) Andrus and Moore. *The Pharma Innovation Journal*, **10** (9): 1633-1638

Hamer, C. and Thompson, T. (1957). Vegetable crops. McGraw Hill Co., Inc. N. X. Toronto, London.

Jaina, P. and Gohel N. (2023). Eco-Safe Management of Potato Early Blight Caused by *Alternaria solani* (Ellis and Martin) Jones and Grout. *Potato Research*. 10.1007/s11540-022-09612-6.

Kavyashree, M. C., Yadahalli, K. B. and Jahagirdar Shamarao (2017). Integrated management of foliar diseases of green gram. *Journal of Ecofriendly Agriculture.* **12** (1) : 71-74.

Mayee, C.D. and Datar V.V. (1986). Phytopathometry, Department of Plant pathology, Marathwada Agricultural University, *Parbhani Technical Bull.,* No**.**1. 145-146.

Mishra, R.S. (2018). Effect of cow products and botanicals on management of *cercospora* leaf spot of fenugreek. *Journal of Plant Disease Sciences,* **13** (1): 62-67.

Munjal, R.L., Lall, G. and Chona, B.L. (1960). Some *Cercospora* species from India-IV. *Indian Phytopath.* 13: 144-149.

Patel, M.K. and Ranganathswamy M. (2024). Efficacy of organic inputs and bio-agents against *Colletotrichum truncatum* causing anthracnose of black gram (*Vigna mungo* L. Hepper). *Plant Archives,* **24** (2): 337-340.

Sastry, K. S. M. and Singh, S. J. (1974). Effect of Yellow Vein Mosaic Virus Infection on Growth and Yield of Okra Crop. *Indian Phytopathology*, **27** ( 3): 294-297.

Singh, J., Data, R. K., Santosh, K. and Rakesh K. (2022). Isolation, purification and management of *Alternaria brassicae* through cow by product *in vitro. The Pharma Innovation Journal,* **11**(4): 700-703.

Sridharan R and Rangaswami G. (1968). Studies on two Cercospora leaf spot of *Abelmoschus esculentus. Indian Phytopath,***21**:37-42.

Wheeler, B. E. J. (1969). An Introduction to Plant Disease. John Wiley Sons Ltd., London, p. 301