



ISSN Print: 2664-844X  
ISSN Online: 2664-8458  
NAAS Rating (2025): 4.97  
IJAFA 2025; 7(11): 387-390  
[www.agriculturaljournals.com](http://www.agriculturaljournals.com)  
Received: 20-09-2025  
Accepted: 23-10-2025

**Rushikesh Ravindra Nimse**  
Department of Plant Pathology,  
College of Agriculture, Latur,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
Maharashtra, India

**Dr. Ravindrakumar Ashokrao Chavan**  
Associate Professor, Department of  
Plant Pathology, College of  
Agriculture, Ambajogai, Vasantrao  
Naik Marathwada Krishi  
Vidyapeeth, Parbhani,  
Maharashtra, India

**Shaikh Abdul Kalam Shaikh Abdul Sami**  
Department of Plant Pathology,  
College of Agriculture, Latur,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
Maharashtra, India

**Gunke Mohammad Sohel Mohammad Sharif**  
Department of Entomology,  
College of Agriculture, Latur,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
Maharashtra, India

**Kondu Soumya**  
Department of Plant Pathology,  
College of Agriculture, Latur,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
Maharashtra, India

**Ashish Ashruba Devkar**  
Department of Plant Pathology,  
College of Agriculture, Latur,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
Maharashtra, India

**Subodh Umesh Gaikawad**  
Department of Plant Pathology,  
College of Agriculture, Latur,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
Maharashtra, India

**Corresponding Author:**  
**Rushikesh Ravindra Nimse**  
Department of Plant Pathology,  
College of Agriculture, Latur,  
Vasantrao Naik Marathwada  
Krishi Vidyapeeth, Parbhani,  
Maharashtra, India

## Management of *Phomopsis* blight of brinjal with various fungicides under field condition

**Rushikesh Ravindra Nimse, Ravindrakumar Ashokrao Chavan, Shaikh Abdul Kalam Shaikh Abdul Sami, Gunke Mohammad Sohel Mohammad Sharif, Kondu Soumya, Ashish Ashruba Devkar and Subodh Umesh Gaikawad**

DOI: <https://www.doi.org/10.33545/2664844X.2025.v7.i11e.982>

### Abstract

*In vivo* efficacy of fungicides were assessed against *Phomopsis vexans* causing *Phomopsis* blight of brinjal. The tested fungicides were Carbendazim 50 % WP, Propiconazole 25 % EC, Hexaconazole 5 % EC, Mancozeb 75 % WP, Propineb 70 % WP, Carbendazim 12 % + Mancozeb 63% WP, Carboxin 37.5% + Thiram 37.5% WP and Pyraclostrobin 13.3% + Epoxiconazole 5 % SE. Field trials were conducted during *Kharif* 2024 in the experimental field of Department of Plant Pathology, College of Agriculture, Latur using Pusa Purple Round variety of brinjal. The trial was laid out in Randomized Block Design with three replications. After the third spray Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 50% WP showed least disease severity of 16.27 % and showed highest disease control 63.25% respectively over the untreated control plot. The same treatment resulted in maximum fruit yield of 28.96 t/ha registering 60.00 % increase in yield over the untreated control plot with ICBR of 1:25.91. The second best treatment was Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 12% + Mancozeb 63% WP showed disease severity of 16.53 % and showed disease control 62.66 % respectively over the untreated control plot with fruit yield of 28.60 t/ha registering 58.01 % increase in yield over the untreated control plot with ICBR of 1:20.74 followed by Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Hexaconazole 5% EC showed disease severity of 16.80 % and showed disease control 62.05 % respectively over the untreated control plot with fruit yield of 28.59 t/ha registering 57.96 % increase in yield over the untreated control plot with highest ICBR of 1:26.00. These treatments were at par with each other and significantly superior over rest of the treatments. The untreated control plot recorded maximum disease severity of 44.27 % and lowest fruit yield 18.10 t/ha.

**Keywords:** Brinjal, *Phomopsis* blight, *Phomopsis vexans*, Fungicides, *in vivo*

### Introduction

Brinjal (*Solanum melongena* L.), belonging to the family Solanaceae is commonly known as eggplant and Guinea squash, which is the native of India from where it spread to other parts of the world (Yawalkar, 1985) [20]. It is one of the most popular and principle fruit vegetable crop grown in the tropical and subtropical regions of India. It is highly productive and usually finds a place as “Poor man’s crop” and also described as “King of Vegetables”, due to its wide usage in Indian foods (Rajan and Markose, 2002) [14]. It is one of the most popular and principle fruit vegetable crop grown in the tropical and subtropical regions of India. Brinjal, besides being a significant vegetable, has been widely used in traditional medicine for treating various ailments (Kashyap *et al.*, 2003) [10]. It is appreciated for its medicinal properties, including its cholesterol-lowering effects, mainly attributed to the polyunsaturated fatty acids (linoleic and linolenic acids) present in the fruit’s flesh and seeds in high quantities. In traditional medicine, brinjal is noted for its use in treating liver diseases, allergies, rheumatism, leucorrhea and intestinal worms. Its seeds are used as stimulants, while its leaves have narcotic properties. Additionally, brinjal is used to alleviate toothache (Nadkarni, 1927) [11]. It is mainly grown in Indian states like Orissa, Bihar, Punjab, West Bengal, Karnataka, Maharashtra, Andhra Pradesh and Uttar Pradesh (Akhtar *et al.*, 2007) [1],

with an area and production of 6,77,000 ha and 1,27,79,000 MT respectively and productivity of 18.87 tons per ha (Anon., 2023) <sup>[2]</sup>. Brinjal suffers from various abiotic stresses like salinity, drought, low and high temperature and heavy-metal as well as biotic stresses including viral, bacterial, fungal, nematodes, phytoplasmal pathogens, parasitic plants and insect herbivores, causing enormous qualitative as well as quantitative losses. Major diseases infecting brinjal are: Damping off (*Pythium aphanidermatum*, *Phytophthora parasitica*, *Rhizoctonia solani*), Leaf spots (*Cercospora melongenae*, *Alternaria melongenae*), Fruit rots (*Phomopsis vexans*, *Pythium* spp., *Fusarium* spp., *Phytophthora* spp., *Colletotrichum* spp., *Alternaria alternata*, *Aspergillus flavus*), Fungal wilt (*Fusarium oxysporum* and *Verticillium dahliae*), Bacterial wilt (*Pseudomonas solanacearum* / *Ralstonia solanacearum*), Collar rot (*Sclerotium rolfsii*), Phytoplasmas and Nematodes (Singh *et al.*, 2014) <sup>[17]</sup>. Among various fungal diseases, *Phomopsis* blight is most widely occurred disease caused by the fungus *Phomopsis vexans* (Sacc. & Syd.). It affects the seedling, leaves, branches and fruits, leading to significant yield and quality losses. The disease typically causes 15-20 % reduction in crop yield. (Jakatimath *et al.*, 2017) <sup>[8]</sup> Hence experiment to find out effective fungicides against *Phomopsis vexans* was conducted under *in vivo* condition.

## Material and Methods / Experimental Details /

**Methodology:** The field experiment was conducted during Kharif, 2024 on experimental farm of Department of Plant Pathology, College of Agriculture, Latur using Pusa Purple Round variety of brinjal to evaluate the efficacy of fungicides against *Phomopsis* blight of brinjal. The trial was laid out in Randomized Block design with three replications. Sowing was done in 3mx 3.6 m plot with 75 cm by 6 cm spacing. Forty five days old seedlings were raised in nursery and transplanted in field. The recommended dose of fertilizers (Recommended by Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani) was applied to crop with 100:50:50 Kg NPK per hectare. Nitrogen was applied in 2 split doses 50% at the time of transplanting as basal dose and remaining 50 % as top dressing. The tested fungicides were Carboxin 37.5% + Thiram 37.5% WP, Carbendazim 50 % WP, Propiconazole 25 % EC, Hexaconazole 5 % EC, Mancozeb 75 % WP, Propineb 70 % WP, Carbendazim 12 % + Mancozeb 63% WP and Pyraclostrobin 13.3% + Epoxiconazole 5 % SE. For each treatment seedlings were dipped in Carboxin 37.5% + Thiram 37.5% WP and three foliar sprays of each tested fungicides were applied.

## Method of recording observations

### Disease severity

For the purpose of measuring the severity of the disease, five plants per treatment in each replication were chosen at random and tagged. Prior to the first spray, an initial observation was made and further observations were made 7 days after each spray. Seven days following the last spray, the final observations were noted and Per cent Disease severity/ intensity were calculated.

Disease intensity of fruit rot was recorded by applying 0-5 rating scale given by Kalda *et al.* (1976) <sup>[9]</sup> and presented in Table below.

### Rating scale for Fruit rot

|                     | Description Scale | Reaction             |
|---------------------|-------------------|----------------------|
| No infection        | 0                 | Immune               |
| 1-5 % infection     | 1                 | Resistant            |
| 5.1 -10 % infection | 2                 | Moderately resistant |
| 10.1-25% infection  | 3                 | Tolerant             |
| 25.1-50% infection  | 4                 | Susceptible          |
| > 50 % infection    | 5                 | Highly susceptible   |

Percent disease intensity (PDI)/severity were calculated as per formula given by Wheeler (1969) <sup>[19]</sup>,

$$\text{Disease intensity} = \frac{\text{Summation of all numerical ratings}}{\text{Total no. of fruits observed} \times \text{higher rating scale}} \times 100$$

The percent disease control (PDC) were calculated by applying formula,

$$\text{PDC} = \frac{\text{PDI in control} - \text{PDI in treatment}}{\text{PDI in control}} \times 100$$

### Yield

Fruits were harvested at maturity and yields of net were recorded as kg per plot and later expressed in tons per ha.

### Statistical analysis

The data obtained in the experiment conducted (*in vivo*) were subjected to statistical analysis. The standard error (S.E.) and critical difference (C.D.) @ 5% level of significance were worked out (Panse and Sukhatme, 1978) <sup>[13]</sup> and per cent data was transformed into arc sine values.

## Results and discussion

**Table 1:** Effect of fungicide spraying on *Phomopsis* blight and yield of brinjal

| Tr. No.        | Treatments                            | Conc. (%) | After Terminal spray |                  | Fruit yield*<br>t/ha | Increased yield over<br>control t/ha | ICBR    |
|----------------|---------------------------------------|-----------|----------------------|------------------|----------------------|--------------------------------------|---------|
|                |                                       |           | PDI*                 | PDC              |                      |                                      |         |
| T <sub>1</sub> | Carbendazim 50 % WP                   | 0.1 %     | 16.27<br>(23.78)**   | 63.25<br>(52.68) | 28.96                | 10.86                                | 1:25.91 |
| T <sub>2</sub> | Propiconazole 25 % EC                 | 0.05 %    | 22.40<br>(28.24)     | 49.40<br>(44.65) | 26.25                | 08.15                                | 1:22.36 |
| T <sub>3</sub> | Hexaconazole 5 % EC                   | 0.1 %     | 16.80<br>(24.19)     | 62.05<br>(51.97) | 28.59                | 10.49                                | 1:26.00 |
| T <sub>4</sub> | Mancozeb 75 % WP                      | 0.2 %     | 24.26<br>(29.50)     | 45.20<br>(42.24) | 25.35                | 07.25                                | 1:16.32 |
| T <sub>5</sub> | Propineb 70 % WP                      | 0.2 %     | 25.07<br>(30.04)     | 43.37<br>(41.19) | 24.16                | 06.06                                | 1:10.98 |
| T <sub>6</sub> | Carbendazim 12 % + Mancozeb<br>63% WP | 0.2 %     | 16.53<br>(23.98)     | 62.66<br>(52.33) | 28.60                | 10.50                                | 1:20.74 |

|                |                                             |       |               |               |       |       |         |
|----------------|---------------------------------------------|-------|---------------|---------------|-------|-------|---------|
| T <sub>7</sub> | Pyraclostrobin 13.3% + Epoxiconazole 5 % SE | 0.1 % | 20.27 (26.75) | 54.21 (47.41) | 27.16 | 09.06 | 1:14.29 |
| T <sub>8</sub> | Control                                     | -     | 44.27 (34.93) | -             | 18.10 | -     | -       |
|                | S.E.(m) ±                                   | -     | 1.03          | -             | 0.96  | -     | -       |
|                | C. D. at 5%                                 | -     | 3.09          | -             | 2.89  | -     | -       |

From Treatments T<sub>1</sub> to T<sub>7</sub> Seedling Dip in Carboxin 37.5% + Thiram 37.5% WP,

\*: Mean of three replications, \*\*: Values in parenthesis are arcsin transformed values,

ICBR: Incremental cost: Benefit Ratio.

The data presented in table 1 indicated that three sprays of fungicides significantly reduced *Phomopsis* blight disease severity and increased the yield over control under field condition. After the third spray the best treatment in reducing disease severity was Treatment T<sub>1</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 50% WP) showed least disease severity of 16.27 % followed by T<sub>6</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 12% + Mancozeb 63% WP), T<sub>3</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Hexaconazole 5% EC), T<sub>7</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Pyraclostrobin 13.3% + Epoxiconazole 5 % SE), T<sub>2</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propiconazole 25% EC), T<sub>4</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Mancozeb 75% WP) and T<sub>5</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propineb 70% WP) with disease severity of 16.53 %, 16.80 %, 20.27 %, 22.40 %, 24.26% and 25.07 %, respectively over the untreated control (44.27%). The treatments T<sub>1</sub>, T<sub>6</sub> and T<sub>3</sub> are at par.

The management of *Phomopsis* blight of brinjal showed substantial disease control in which treatment T<sub>1</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 50% WP showed highest disease control (63.25%) followed by treatment T<sub>6</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 12% + Mancozeb 63% WP (62.66%), T<sub>3</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Hexaconazole 5% EC (62.05%), T<sub>7</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Pyraclostrobin 13.3% + Epoxiconazole 5 % SE (54.21%), T<sub>2</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propiconazole 25% EC (49.40%), T<sub>4</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Mancozeb 75% WP (45.20%) and T<sub>5</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propineb 70% WP (43.37%).

Similar results were reported by Singh *et al.* (2012)<sup>[18]</sup> who assessed the effectiveness of five fungicides Bavistin (0.1%), Vitavax (0.1%), Blitox-50 (0.2%), Ridomil (0.2%), Indofil M-45 (0.2%) and one bio-pesticide Nimbidine (0.5%), on disease severity and yield of brinjal. They found that spraying Bavistin (0.1%) and Vitavax (0.1%) at 15-day intervals was most effective in reducing disease incidence and increasing yield. conducted experiment to assess the efficacy of different fungi toxicants in *in-vivo* condition and observed that seed treatment with Saaf @ 2g/kg seed + 2 foliar sprays with Contaf @ 0.1% recorded least disease intensity with highest fruit yield.

The data in table 1 represented that the significant difference in yield of brinjal due to various treatments over the untreated control. Among the treatments, highest yield of 28.96 t/ha was obtained in treatment T<sub>1</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray

Carbendazim 50% WP) followed by T<sub>6</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 12% + Mancozeb 63% WP) 28.60 t/ha, T<sub>3</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Hexaconazole 5% EC) 28.59 t/ha, T<sub>7</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Pyraclostrobin 13.3% + Epoxiconazole 5 % SE) 27.16 t/ha, T<sub>2</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propiconazole 25% EC) 26.25 t/ha, T<sub>4</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Mancozeb 75% WP) 25.35 t/ha and T<sub>5</sub> (Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propineb 70% WP) 24.16 t/ha over the untreated control 18.10 t/ha.

Results documented in the table 1 showed that, higher benefits were recorded from the treatment T<sub>3</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Hexaconazole 5% EC and recorded highest ICBR 1:26.00. The second best treatment was found to be T<sub>1</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 50 % WP with ICBR 1:25.91, followed by treatments T<sub>2</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propiconazole 25% EC (49.40%), T<sub>6</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 12% + Mancozeb 63% WP (62.66%), T<sub>4</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Mancozeb 75% WP (45.20%), T<sub>7</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Pyraclostrobin 13.3% + Epoxiconazole 5 % SE (54.21%), and T<sub>5</sub>: Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Propineb 70% WP (43.37%) which recorded ICBR as, 1:22.36, 1:20.74, 1:16.32, 1:14.29 and 1:10.98, respectively over the untreated control. Similar results were reported by Beura *et al.*, (2008) recorded maximum fruit yield (227.25 q/ha) registering 71.12 % increase in yield over control with maximum cost benefit ratio of 1:12.85 and Chaukhe *et al.*, (2017)<sup>[4]</sup> who reported that maximum yield of brinjal (185.52 q/ha) registering 32.10 % increase in yield over control with maximum cost benefit ratio of 1:12.87 with carbendazim (0.1%) against *Phomopsis* blight of brinjal.

## Conclusion

Seedlings dip with Carboxin 37.5% + Thiram 37.5% WP and spray of Carbendazim 50% WP found most effective in controlling *Phomopsis* blight showed least disease severity of 16.27 % and showed highest disease control 63.25% respectively over the untreated control plot. The same treatment resulted in maximum fruit yield of 28.96 t/ha registering 60.00 % increase in yield over the untreated control plot with ICBR of 1:25.91. The second best treatment was Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Carbendazim 12% + Mancozeb 63% WP showed disease severity of 16.53 % and showed disease control 62.66 % respectively over the untreated control plot with fruit yield of 28.60 t/ha registering 58.01 % increase in yield



over the untreated control plot with ICBR of 1:20.74 followed by Seedling dip with Carboxin 37.5% + Thiram 37.5% WP and Spray Hexaconazole 5% EC showed disease severity of 16.80 % and showed disease control 62.05 % respectively over the untreated control plot with fruit yield of 28.59 t/ha registering 57.96 % increase in yield over the untreated control plot with highest ICBR of 1:26.00. These treatments were at par with each other and significantly superior over rest of the treatments. All treated fungicides were found effective in management of *Phomopsis* blight as compared to control.

## References

1. Akhtar J, Chube HS, Singh HB. *Phomopsis* blight and fruit rot of brinjal. In: Biotechnology Plant Health Management. 2007. p. 421-38.
2. Anonymous. Agricultural Statistics at a Glance. 2023. p. 94.
3. Beura SK, Mahanta IC, Mahapatra KB. Economics and chemical control of *Phomopsis* twig blight and fruit rot of brinjal. J Mycopathol Res. 2008;46(1):73-6.
4. Chaukhe AN, Patil MJ, Sawai HR, Parate RL, Chargin SU. Fungicidal control of *Phomopsis* blight of brinjal. Int J Res Biosci Agric Technol. 2017;5(2):398-400.
5. Chaukhe AN, Patil MJ, Tekale AG, Deshmukh AP. Effect of chemical control of *Phomopsis* blight of brinjal caused by *Phomopsis vexans*. Int J Chem Stud. 2020;8(4):2051-3.
6. Choudhary B, Gaur K. The development and regulations of Bt brinjal in India. ISAAA. 2009;38:1-2.
7. Islam M, Asaduzzaman M, Faruk M, Hossain M, Sarker M, Alam K. Environmental and chemical control of *Phomopsis* blight and fruit rot of eggplant caused by *Phomopsis vexans*. J Sci Found. 2021;18(2):81-7.
8. Jakatimath S, Mesta R, Mushrif S, Biradar IB, Ajjappanavar PS. *In vitro* evaluation of fungicides, botanicals and bio-agents against *Phomopsis vexans*, the causal agent of fruit rot of brinjal. J Pure Appl Microbiol. 2017;11:229-35.
9. Kalda TS, Swarup V, Choudhary B. Studies on resistance to *Phomopsis* blight in eggplant (*Solanum melongena* L.). Veg Sci. 1976;3:65-70.
10. Kashyap SV, Collonier C, Fusari F, Haicor R, Rotino GL, Sihachakr D, *et al.* Biotechnology of eggplant. Sci Hortic. 2003;97(1):1-25.
11. Nadkarni KM. Indian Materia Medica. 2nd ed. Bombay: Popular Prakashan; 1927.
12. Pani BK, Singh DV, Nanda SS. Chemical control and economics of *Phomopsis* blight and fruit rot of brinjal in the Eastern Ghat Highland Zone of Odisha. Int J Agric Environ Biotechnol. 2013;6:581-3.
13. Panse VG, Sukhatme PG. Statistical Methods for Agriculture Workers. New Delhi: IARI; 1978.
14. Rajan S, Markose BL. Propagation of Horticultural Crops. Horticulture Science Series. 2002;6:94.
15. Rohini, Gowtham HG, Niranjana SR. Evaluation of efficacy of fungicides against *Phomopsis* leaf blight of brinjal (*Solanum melongena* L.). Int J Agric Sci Resour. 2015;5(6):45-50.
16. Ekka S, Kumar M, Lal HC, Chakravarty MK, Soren A. Management of fruit rot of brinjal caused by *Phomopsis vexans* through fungicides, plant extract and host plant resistance. Int J Curr Microbiol Appl Sci. 2018;7:5119-24.
17. Singh BK, Singh S, Singh GK, Yadav SM. Some important plant pathogenic diseases of brinjal (*Solanum melongena* L.) and their management. Plant Pathol J. 2014;13:208-13.
18. Singh R, Singh PC, Kumar D, Sachan NS. Management of *Phomopsis* leaf blight of brinjal through different fungicides and biopesticides. HortFlora Res Spectr. 2012;1:371-4.
19. Wheeler BEJ. An Introduction to Plant Diseases. London: John Wiley & Sons Ltd.; 1969. p. 301.
20. Yawalkar KS. Vegetable Crops in India. Nagpur: Agriculture and Horticulture Publishing House; 1985. p. 85.