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**Plant Pathology**

# Chemical Control and Economics of Phomopsis Blight and Fruit Rot of Brinjal in the Eastern Ghat Highland Zone of Odisha

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**Abstract**

A field trial was conducted during 2011 and 2012 for management of phomopsis blight and fruit rot of brinjal caused by *Phomopsis vexans* by seed treatment with carboxin 37.5 % + thiram 37.5 % (Vitavax power) @ 2 g/kg and foliar application of copper oxychloride (Blitox-50) @ 0.3 %.The disease and economic parameters as well as yield were compared with that of untreated farmers' field. It was revealed that the plant protection chemicals increased the seed germination by 21.18 % and reduced seedling mortality, seedling blight and fruit rot infection by 90.25, 74.51 and 65.9 %, respectively. The improved germination and reduced disease infections helped to sustain 40.28 % higher brinjal yield with a net higher return of Rs. 26513 per ha.

**Highlights**

- Seed treatment with carboxin + thiram (2g/kg) and spraying with copper oxychloride (0.3 %) successfully reduced phomopsis blight and fruit rot of brinjal
- Chemically treated plots sustained 40.28 % higher brinjal yield compared to untreated control.
- The recommended technology also supported higher economic return of Rs. 26513 per ha.

**Keywords:** Phomopsis blight, fruit rot, brinjal

Brinjal (*Solanum melongena* L.) is a popular and widely cultivated vegetable crop grown almost worldwide. India is considered to be the centre of origin of cultivated brinjal (Thompson and Kelly, 1957)] from where it spread to other parts of the world (Choudhury and Kalad,1968). It is regarded as a cash crop in the tribal dominated Nabarangpur district of Odisha. In Odisha, brinjal is cultivated in 1.276 million ha with a yield of 18.50 million tonnes. The productivity in the state is, however, only 14.50 tonnes/ha (Beura *et al*., 2008). This low productivity is due to many biotic and abiotic stresses, insect and disease attack being the major limiting factors. The crop is known to suffer from 12 diseases and amongst them phomopsis blight and fruit rot caused by *Phomopsis vexans* has been one of the major constraints of brinjal cultivation (Das, 1998; Khan, 1999; Islam and Meah, 2011; Jayaramaih *et al*., 2013). Apart from causing leaf blight, it also causes fruit rot (Singh, 1992; Ashrafuzzaman, 2006). Pale to light brown sunken spots develop on the fruits. Individual spots expand and coalesce to cause fruit rot. In general, farmers in the district

don't use any fungicide for plant protection as the symptoms of the disease is often mistaken as a fall out of stem and fruit borer attack. Many workers have reported the varied efficacy of chemical fungicides to manage the disease. In the present study, two plant protection chemicals *viz.* carboxin + thiram and copper oxychloride were tested *vis-a-vis* no use of any fungicide by the farmers to study their effect on disease incidence and yield of brinjal in field conditions. The use of these chemicals in the investigation were suggested by Orissa University of Agriculture and technology, Bhubaneswar and approved by the Zonal Project Directorate of the Krishi Vigyan Kendras at Jabalpur.

## Materials and Methods

On-farm trials and front line demonstrations were carried out by the Krishi Vigyan Kendra, Nabarangpur in 10 farmers' field during the year 2011 and 2012 for management of phomopsis blight and fruit rot of brinjal incited by the fungus, *Phomopsis vexans*. Brinjal variety Green Star was used in the investigation. The seeds were treated with Carboxin 37.5 % + thiram 37.5% (Vitavax power) @ 2g/kg of seeds. Standard agronomic practices of cultivation with 60 cm X 45 cm spacing and recommended fertilizer dose of 125 : 50 : 75 kg NPK per ha were followed. The crop was sprayed with copper oxychloride (Blitox-50) @ 0.3 %, 2 times i.e. 30 days after transplanting and just after initiation of fruits. The treated plots (T2) were compared with the untreated plots (T1). Observations on the incidence of fruit rot and yield were recorded. Benefit over cost (BC) ratio was calculated by dividing the gross return by the gross cost.

## Results and Discussion

It was evident from the study that the phomopsis blight and fruit rot of brinjal caused by *Phomopsis vexans* can be successfully managed by seed treatment with carboxin + thiram and foliar application of Copper oxychloride (Table 1). These chemicals reduced the incidence of seedling mortality, seedling blight and fruit rot infection and increased yield of brinjal compared to untreated farmers' field. The pooled data of two consecutive years revealed that use of vitavax power (carboxin + thiram) as seed treatment helped to increase germination and the plant stand was better from germination to maturity. The seed germination improved by 21.18 %. The systemic and protective action of vitavax power might have helped for higher sprouting and better crop stand. The effectiveness of vitavax power in seed treatment has already been established (Sajan *et al*., 2011). Beura *et al.,* (2008) and Ramesh Singh *et al.,* (2012) has reported the efficacy of Blitox-50 in managing phomopsis blight and fruit rot in brinjal. There was 90.25 % and 74.51 % reduction in mortality of seedlings and incidence of seedling blight, respectively in treated plots compared to untreated farmers' plots. The fruit rot incidence was also

**Table 1:** Disease symptoms and brinjal production as influenced by fungicidal treatment

| Year | Germination(%) | | Seedling mortality(%) | | Seedling blight(%) | | Fruit rot(%) | | Yield(q/h) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | T1 | T2 | T1 | T2 | T1 | T2 | T 1 | T2 | T1 | T2 | CD(0.05) |
| Kharif 2011 | 82.5 | 98.4 (+19.27) | 32.9 | 2.4 (-92.70) | 21.7 | 5.9 (-72.81) | 19.8 | 6.7 (-66.1) | 134.8 | 192.3 (+42.60) | 34.8 |
| Kharif 2012 | 80.1 | 98.6 (+23.09) | 29.7 | 3.7 (-87.54) | 20.0 | 4.8 (-76.00) | 20.2 | 6.9 (-65.8) | 142.3 | 196.4 (+38.01) | 41.3 |
| Pooled Mean | 73.3 | 98.5 | 31.3 (+21.18) | 3.0 (-90.25) | 20.8 | 5.3 (-74.51) | 20.0 | 6.8 (-65.9) | 138.5 | 194.3 (+40.28) | - |

Figures in parentheses indicate per cent increase/decrease in respective parameters

**Table 2:** Economics of chemical control of phomopsis blight and fruit rot of brinjal

| Year | Gross Cost of cultivation/ha(Rs) | | Gross return/ha(Rs) | | Net Return/ha(Rs) | | B:C Ratio | |
|---|---|---|---|---|---|---|---|---|
| | T1 | T2 | T1 | T2 | T1 | T2 | T1 | T2 |
| Kharif2011 | 30446 | 35912 | 88880 | 115560 | 50434 | 79748(29314) | 2.65 | 3.21 |
| Kharif2012 | 31240 | 35987 | 85380 | 117840 | 54140 | 81853(27713) | 2.73 | 3.27 |
| Pooled Mean | 33179 | 35950 | 87130 | 116700 | 54287 | 80800(26513) | 2.69 | 3.24 |

Figures in parentheses indicate net return of treated plots over untreated farmers' plots/ha

 

found to be effectively managed by the application of chemicals. There was 65.9 % reduction in the fruit rot symptoms in the crop. The improvement in germination and reduction in disease occurrence induced 40.28 % increase in brinjal yield and sustained Rs. 26513 per hectare higher net return of to the farmers (Table 2).


**Fig. 1:** Diseased specimen showing fruit rot of brinjal

## Conclusion

It is concluded that phomopsis blight and fruit rot of brinjal can be effectively managed by seed treatment with carboxin + thiram (Vitavax power) and foliar application of copper oxychloride (Blitox-50) @ 0.3 %, 2 times. The improved germination and reduced disease infections can sustain 40.28 % higher brinjal yield with a net higher return of Rs. 26513 per ha in this recommended practice *vis-a-vis* untreated farmers' practice.

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