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Prevalence and management through relative performance of organic mulches and fungitoxicants of noxious Phomopsis fruit rot (*Phomopsis vexans*, Sacc. & Syd.) Harter, in brinjal ecology of Kashmir

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Abstract
Phomopsis fruit rot is one of the most important diseases of brinjal (*Solanum melongena* L.) worldwide. The present study was, therefore carried out to know the status of the fruit rot in Kashmir valley and to evolve an effective management strategy. The overall mean fruit rot incidence and intensity was 35.75 and 14.11 per cent, respectively. The maximum disease incidence of 42.25 and intensity of 16.24 per cent on fruits was observed in district Budgam and minimum disease incidence of 29.25 and intensity of 11.99 per cent was observed in district Pulwama. Among the fungitoxicants, propiconazole 25 EC proved to be most effective as it indicated maximum per cent disease control, followed by carbendazim 50 WP, copper oxychloride 50WP and metalaxyl + mancozeb 68 WP in the decreasing order of their efficacy. Among the mulches applied rice straw proved to be most effective followed by wheat straw over check. Among the interactions propiconazole 25 EC + rice straw proved to be most effective over check followed by carbendazim 50 WP + rice straw, propiconazole 25 EC + wheat straw, copper oxychloride 50 WP + rice straw, carbendazim 50 WP+ wheat straw, copper oxychloride 50WP + wheat straw, metalaxyl + mancozeb 68 WP + rice straw and metalaxyl + mancozeb 68 WP + wheat straw in the decreasing order of their efficacy.

Keywords: brinjal, phomopsis, fruit rot, fungitoxicants, management

1. Introduction
Brinjal (*Solanum melongena* L.) is locally known as "Wangun" in Kashmir and usually finds a place as "poor man's crop". It is a versatile crop adapted to different agro climatic regions and can be grown throughout the year but in Kashmir it is grown only during the summer from June to October. It is also known as eggplant due to the shape of fruit of some varieties which are white and shaped similarly to chicken eggs (Santos *et al*., 2010) [13]. In Jammu and Kashmir, it is cultivated over an area of 2.02 thousand hectares with an annual production of 45.24 thousand MT and productivity of 22.39 tonnes per hectare (Anonymous, 2014) [1]. In Kashmir it is grown as a warm season crop but is susceptible to severe frost. It is valued for its medicinal properties and has got decholestrolizing property primarily due to presence of poly-unsaturated fatty acids (linoleic and lenolenic) present in flesh and seeds of fruit in higher amount. Brinjal is attacked by many fungal, bacterial, viral and nematode diseases of which Phomopsis fruit rot, caused by *Phomopsis vexans* (Sacc. and Syd.) Harter is considered to be the most destructive and one of the major constraints of brinjal production in the tropics and subtropics worldwide (Jayaramaih *et al*., 2013) [11]. Apart from causing leaf blight, it also causes fruit rot (Ashrafuzzaman, 2006) [2]. The disease affects the crop from seedling to maturity. The seed borne nature of *P. vexans* has become aggressive to cause the fruit rot in Kashmir and other states. This form attacks the brinjal at any stage of fruit development and has threatened not only the profitability and market value of the fruits by nearly 20-30% (Jain and Bhatnagar, 1980) [10], but also adversely affects the nutritive value (Bhale *et al.*, 2001) [4]. Symptoms may appear on leaves and stems; however, fruits are most commonly affected which appear as small, circular lesions. Fruit lesions are sunken, discolored and soft with a surrounding margin of black fruiting bodies. If conditions become dry, infected fruits turn shriveled, dry and form black mummies (Kumar *et al*., 1986) [12]. In Kashmir, severe epidemics resulted in yield loss upto 47% (Nisar *et al.*, 2015). Earlier on in 2002, Cristina identified Phomopsis blight as major disease of eggplant resulting in enormous losses of fruit

yield of about 40 to 70 per cent of the total harvest under favorable environmental conditions. Phomopsis blight is an unsightly disease that not only harms eggplants, but makes them inedible and unmarketable which undermines their role in nutrition, health and income generation. Management of brinjal fruit rot caused by *P. vexans* has mainly been through the use of fungicides. However, fungicide applications are only partially effective under environmental conditions that are favourable for pathogen infection. Furthermore, fungicides are not sustainable especially in small holding farming system in Kashmir, due to the high cost and risks to the environment. Keeping the prospects under the economic importance of the crop and amount of destruction by P.vexans, a field survey was conducted to ascertain the status of disease in Kashmir and to find out the effective fungicides and mulches against the disease.

2. Materials and Methods

2.1 Status of Phomopsis fruit rot of brinjal

Intensive survey of main brinjal growing areas in the districts of Budgam, Pulwama and Srinagar of the Kashmir valley was conducted during the second fortnight of August in the year 2014 to record the incidence and intensity of Phomopsis fruit rot of brinjal. In each district four locations were observed for fruit rot and in each location randomly four brinjal growing fields were surveyed. In all 48 sites were observed at 12 locations. Randomly 50 fruits from each of the site were collected to record the per cent incidence and intensity of Phomopsis fruit rot of brinjal.

2.2 Fruit rot incidence (%)

Disease incidence was determined by counting number of damages caused by disease on the fruits from the total harvested fruits of each harvesting time. Fruit was considered damaged if single lesion was found. Per cent fruit rot incidence was calculated by using the following formula:

$$\text{Per cent fruit rot incidence} = \frac{\text{Number of diseased fruits}}{\text{Total Number of fruits observed}} \times 100$$

2.3 Fruit rot severity (%)

The fruit rot severity was measured in the fruits according to the following 1-8 scale described by Sharma *et al*., 2011 [14]. Eight categories were made on the basis of per cent fruit involved as per the following key:

Grade	Numerical value	Fruit rot (%)
1	0	0
2	1	1-10
3	2	11-25
4	3	26-50
5	4	51-75
6	5	76-90
7	6	91-99
8	7	100

Per cent fruit rot severity was calculated as per the following formula:

$$DS = \frac{\sum (n \times v)}{N \times G} \times 100$$

Where,

DS= Disease severity (fruit rot severity)

$\sum$ = Summation

n = Number of diseased fruits in each category

v = Numerical value of the category/severity scale

N = Total number of fruits examined, and

G = Highest grade value (8)

The research field trial was established at SKUAST-K, Shalimar during the kharif season of the year 2014-15 and the total field was divided into 15 equal treatments/plots having three replications with size of each plot 3×3 m square. The Brinjal plants of variety Pusa Purple Long were planted with a spacing of 60×60 cm square and Randomized Complete Block Design was used to layout the design of experiment. Four fungicides viz. Carbendazim 50WP@0.1 per cent, Copper oxychloride 50WP@0.3 per cent, Metalaxyl + mancozeb 68WP@0.15 per cent and Propiconazole 25 EC@0.15 per cent; two mulches viz. Rice straw and wheat straw at the rate of 5 t/ha and control were considered as treatments. Each treatment was replicated thrice. Fifteen treatments including control (without treatment) were used. Each plot was given a single treatment in the first week of August. T1= No chemical + No mulch (control), T2=No chemical+ Rice straw, T3= No chemical + Wheat straw, T4= Carbendazim 50WP + No mulch, T5= Carbendazim 50WP + Rice straw, T6= Carbendazim 50WP + Wheat straw, T7= Copper oxychloride 50WP + No mulch, T8= Copper oxychloride 50WP + Rice straw, T9= Copper oxychloride 50WP + Wheat straw, T10= Metalaxyl + mancozeb WP +No mulch, T11= Metalaxyl + mancozeb 68 WP + Rice straw, T12= Metalaxyl + mancozeb 68 WP + Wheat straw, T13= Propiconazole 25 EC + No mulch, T14= Propiconazole 25 EC + Rice straw, T15= Propiconazole 25 EC + Wheat straw. The fungitoxicants were sprayed twice at 15 days interval at the recommended concentrations against the target plot. The mulches were stratified on the ground in the concerned plots to avoid the contact between the pathogen and the fruit. The control plot was kept without mulch and no fungitoxicant was sprayed to assess the extent of damage caused by the fruit rot pathogen. In each plot 50 fruits were selected to assess the fruit rot incidence, intensity and the disease control over the check. Further on an average 5 plants were selected in each plot and the number of fruits of these plants were counted. Diseased and healthy fruits were counted to determine the percentage of the yield that was marketable in each plot. These fruits were weighed and the total yield and per cent yield loss was calculated. The data of the various experiments were subjected to statistical analysis with the help of computer. The data was subjected to appropriate transformation wherever needed, as suggested by Gomez and Gomez (1984) [7].

3. Results and Discussion

3.1 Occurrence and distribution

Survey was carried out in Budgam, Pulwama and Srinagar districts of the Kashmir valley during the second fortnight of August in the year 2014 to record the incidence and intensity of Phomopsis fruit rot of brinjal. The data regarding incidence and intensity of the disease is presented in Table 1.

3.2 Fruit rot incidence and intensity

The results obtained (Table 1) reveal that phomopsis fruit rot of brinjal was prevalent in all the three districts surveyed. The highest fruit rot incidence and intensity of 42.2 per cent and 16.24 per cent, respectively, was recorded in district Budgam, while as the district Srinagar exhibited the least fruit rot incidence and intensity of 29.25 per cent and 11.99 per cent, respectively. Among the locations surveyed, the fruit rot incidence and intensity was highest (46.5% and 20.35%) in

Narkara village of district Budgam followed by Badipora (44.5% and 15.21%) and Bogam (44% and 15.99%) locations of same district showing no significant difference. Kangan location of Pulwama district exhibited the fruit rot incidence and intensity of 35 per cent and 13.28 per cent which did not differ significantly from that of Khag location of Budgam district with fruit rot incidence and intensity of 34 per cent and 13.42 per cent and Kakapora (33% and 12.71%) location of district Pulwama. The least fruit rot incidence and intensity on fruits was observed in Rajpora (22% and 9.06%) followed by Awantipora (27% and 12.92%) locations of district Pulwama. In district Srinagar, the highest incidence on fruits was found in Habak (35%) followed by Telbal (34%) while as least incidence was found in Harwan (22%). Among the intensity values, the highest intensity in district Srinagar was found in Shalimar (20.35%) followed by Telbal (13.42%) while as lowest intensity was found in Habak (11.99%).

Table 1: Status of Phomopsis fruit rot of brinjal during the Kharif year 2014-15

District	Location/Site	Fruit rot	
		Incidence (%)	Intensity (%)
Budgam	Bogam	44.00(6.63)	15.99 (4.00)
	Narkara	46.50 (6.82)	20.35 (4.51)
	Khag	34.00(5.83)	13.42 (3.66)
	Badipora	44.50(6.67)	15.21(3.90)
Sub-Mean		42.25(6.50)	16.24(4.03)
Pulwama	Kangan	35.00(5.92)	13.28(3.64)
	Kakapora	33.00 (5.74)	12.71(3.57)
	Awantipora	27.00(5.20)	12.92(3.59)
	Rajpora	22.00(4.69)	9.06(3.09)
Sub-Mean		29.25(5.41)	11.99(3.46)
Srinagar	Harwan	22.00 (4.69)	12.92 (3.59)
	Telbal	34.00 (5.83)	13.42 (3.66)
	Habak	35.00 (5.92)	11.99 (3.46)
	Shalimar	29.25 (5.41)	20.35 (4.51)
Sub-Mean		30.06 (5.46)	14.67 (3.80)

*Figures in parenthesis are square root transformed values

C.D ($p \leq 0.05$)		
District	0.60	0.29
Location	0.53	0.23
District × Location	1.06	0.54

In the present study, survey conducted in three districts of Kashmir valley during 2014-15 indicated that phomopsis fruit rot of brinjal was more or less prevalent in all the locations of the districts surveyed. The survey revealed that the disease varied among the locations of different districts. Similar variations in the disease have also been reportedly observed in different brinjal growing areas of India (Sharma *et al.*, 2011 and Hossain *et al*., 2013) [14]. Significantly highest mean fruit rot incidence and mean intensity of 42.25 per cent and 16.24 per cent, respectively, was recorded on fruits in district Budgam. Significantly least mean fruit rot incidence and intensity of 29.25 per cent and 11.99 per cent, respectively, on fruits was observed in district Pulwama. These findings are confirmed with the established phenomenon of disease development i.e. more the fruit rot incidence more will be the intensity of disease (Fry, 1988) [6]. Higher disease at some locations of districts could be attributed to use of infected seed, higher plant density leading to higher relative humidity in the microclimate of the plants, higher temperature during the growing season, besides non disposal of fallen diseased leaves, fruits and plant debris. These observations are supported by the findings of earlier workers (Vishunavat and Kumar, 1993; Howard and David, 2007) [16, 9].

3.3 Effects of fungicides and mulches on the fruit rot incidence and intensity of brinjal

The results presented in Table 2 revealed that all the treatments had significant effect in reducing per cent fruit rot incidence and intensity of Phomopsis fruit rot of brinjal over check. Among the fungitoxicants, propiconazole 25 EC and carbendazim 50 WP which were at par, proved to be most effective in reducing fruit rot incidence to 12.00 per cent followed by copper oxychloride 50 WP and metalaxyl + mancozeb 68 WP exhibiting fruit rot incidence of 14.00, 18.00 and 19.00 per cent respectively. Among the mulches applied rice straw was most effective over check exhibiting fruit rot incidence of 64.00 per cent followed by wheat straw which exhibited fruit rot incidence of 66.00 per cent. A significant combination existed between the test fungitoxicants and mulches. Among the interactions propiconazole 25 EC + rice straw proved to be most effective over check exhibiting fruit rot incidence of 2.66 per cent followed by propiconazole 25 EC + wheat straw (8.66%) which was at par with carbendazim 50 WP+ rice straw (10.66%), carbendazim 50 WP + wheat straw (10.66) and copper oxychloride 50 WP + wheat straw(11.33). Moreover, copper oxychloride 50 WP + rice straw, metalaxyl + mancozeb 68 WP + rice Straw and metalaxyl + mancozeb 68 WP + wheat straw exhibited fruit rot incidence of, 12.66, 15.33 and 16.66 per cent respectively. In case of intensity, propiconazole 25 EC and carbendazim 50 WP which are at par, proved to be most effective as they reduced fruit rot intensity to 5.52 and 5.66 per cent respectively compared to check exhibiting fruit rot intensity of 30.47 per cent, followed by copper oxychloride 50 WP which was at par with metalaxyl + mancozeb 68 WP exhibiting fruit rot intensity of 6.85 and 7.52 per cent respectively. Among the mulches applied rice straw proved to be most effective over check exhibiting fruit rot intensity of 21.13 per cent followed by wheat straw which exhibited fruit rot intensity of 25.52 per cent. A significant interaction existed between the test fungitoxicants and mulches. Among the interactions propiconazole 25 EC + rice straw proved to be most effective over check exhibiting fruit rot intensity of 0.85 per cent followed by propiconazole 25 EC + wheat straw (2.85%) which was at par with carbendazim 50 WP + rice straw (2.85). Moreover, copper oxychloride 50 WP + rice straw exhibited fruit rot intensity of 4.47 per cent which was at par with, carbendazim 50 WP + wheat straw, copper oxychloride 50WP + wheat straw and metalaxyl + mancozeb 68 WP + rice straw exhibiting fruit rot intensity of 4.76, 4.85 and 5.80 per cent respectively. Metalaxyl + mancozeb 68 WP + wheat straw exhibited a fruit rot intensity of 7.23 per cent.

3.4 Effect of fungicides and mulches on disease control over check

Table 2 revealed that all the treatments had significant effect on per cent disease control of Phomopsis fruit rot of brinjal over check. Among the fungitoxicants, propiconazole 25 EC which was at par with carbendazim 50 WP proved to be most effective as they indicated a maximum disease control of 81.88 and 81.42 per cent compared to check, followed by copper oxychloride 50WP which was at par with metalaxyl+ mancozeb 68WP exhibiting disease control of 77.51 and 75.31 per cent, respectively. Among the mulches applied rice straw proved to be most effective over check exhibiting

disease control of 30.65 per cent followed by wheat straw which exhibited disease control of 16.24 per cent. A significant interaction existed between the test fungitoxicants and mulches. Among the interactions propiconazole 25 EC + rice straw proved to be most effective over check exhibiting disease control of 97.21 per cent followed by propiconazole 25 EC + wheat straw (90.64%) which was at par with carbendazim 50 WP + rice straw(90.64). Moreover, copper oxychloride 50 WP + rice straw exhibited disease control of 85.23 per cent which was at par with carbendazim 50 WP+ wheat straw, copper oxychloride 50WP + wheat straw and metalaxyl + mancozeb 68 WP + rice straw exhibiting disease control of 84.37, 84.08 and 80.96 per cent respectively. Metalaxyl + mancozeb 68 WP + wheat straw exhibited a disease control of 76.27 per cent over check.

Table 2: Effect of fungicides and mulches on incidence/intensity and disease control over check in eggplant (%)

Fungicide		Mulch					
Treatment	Dosage (%)	No mulch (M_0)		Rice straw (M_1)		Wheat straw (M_2)	
		Incidence (Intensity)	Disease control	Incidence (Intensity)	Disease Control	Incidence (Intensity)	Disease Control
Carbendazim 50 WP (F_1)	0.1	14.0 (5.66)	81.42	10.6(2.85)	90.64	10.6(4.76)	84.37
Copper oxychloride 50 WP (F_2)	0.3	18.0(6.85)	77.51	12.6(4.47)	85.23	11.3(4.85)	84.08
Metalaxyl + Mancozeb 68 WP (F_3)	0.15	19.3(7.52)	75.31	15.3(5.8)	80.96	16.6(7.23)	76.27
Propiconazole 25 EC (F_4)	0.15	12.0(5.52)	81.88	2.66(0.85)	97.21	8.66(2.85)	90.64
Control/water spray (F_0)	-	67.6(30.4)	-	64.0(21.1)	30.65	66.0(25.5)	16.24
C.D ($p \leq 0.05$)	for incidence and intensity for disease control						
Fungicide	:	0.27(0.24)		0.14			
Mulch	:	0.10(0.18)		0.19			
Mulch× Fungicide	:	0.36(0.65)		0.33			

3.5 Effect of fungicides and mulches on the fruit weight of brinjal

Table 3 revealed that all the treatments had significant effect on fruit weight of brinjal over check. Among the fungitoxicants, propiconazole 25 EC proved to be most effective as the average weight of fruits harvested was recorded 103.66 g indicating an increase of 70.82 per cent compared to check exhibiting an average weight of 69.66 g per fruit, followed by carbendazim 50 WP which was at par with copper oxychloride 50 WP exhibiting weight per fruit on an average to 98.33 and 97.66 g indicating an increase of 41.82 and 40.86 per cent respectively. Metalaxyl + mancozeb 68WP exhibited an average weight of 96.33 g per fruit indicating an increase of 38.94 per cent. Among the mulches applied rice straw proved to be most effective over check as the average weight was recorded 83.33 g fruit indicating an increase of 19.62 per cent compared to check followed by wheat straw exhibiting an average weight of 81.33 g per fruit indicating an increase of 16.75 per cent. Among the interactions propiconazole 25 EC + Rice straw proved to be most effective over check exhibiting an average weight of 119.0 g per fruit followed by carbendazim 50 WP + rice straw (113.33 g), propiconazole 25 EC+ wheat straw (109.66 g), copper oxychloride 50 WP + rice straw (107.66 g) which was at par with carbendazim 50 WP + wheat straw (106.66 g) indicating an increase of 70.82, 62.69, 57.42, 54.55 and 53.11 per cent, respectively. Moreover, copper oxychloride 50 WP + wheat straw exhibited an average weight of 104.66 g per fruit followed by metalaxyl + mancozeb 68 WP + rice Straw (102 g) which was at par metalaxyl + mancozeb 68 WP + wheat straw indicating an increase of 50.24, 47.12 and 46.15 per cent, respectively.

3.6 Effect of fungicides and mulches on fruit yield of brinjal

The data presented in table 4 revealed that all the treatments had significant effect on fruit yield of brinjal over check. Among the fungitoxicants, propiconazole 25 EC proved to be most effective as the average fruit yield recorded was 154.92 q/ha indicating an increase of 88.40 per cent compared to check exhibiting an average fruit yield of 82.23 q/ha, followed by carbendazim 50 WP, copper oxychloride 50 WP and metalaxyl+ mancozeb 68WP exhibiting average fruit yield of 139.30, 130.50 and 121.22 q/ha indicating an increase of 69.40, 58.50 and 47.41 per cent, respectively. Among the mulches applied rice straw proved to be most effective over check as the average fruit yield was recorded 111. 35 q/ ha indicating an increase of 35.34 per cent compared to check followed by wheat straw exhibiting an average fruit yield of 102.34 q/ha indicating an increase of 24.45 per cent. Among the interactions propiconazole 25 EC + rice straw proved to be most effective over check exhibiting an average fruit yield of 215.20 q/ha followed by carbendazim 50 WP + rice straw (187.30 q/ha), propiconazole 25 EC + wheat straw (172.97q/ha) which was at par with copper oxychloride 50 WP + rice straw (169.28 q/ha) indicating an increase of 161.70, 127.77, 110.34 and 105.86 per cent, respectively. Carbendazim 50 WP + wheat straw exhibited an average yield of 163.88 q/ha followed by copper oxychloride 50 WP + wheat straw (151.0 q/ha) which was at par with metalaxyl + mancozeb 68 WP + rice straw (144.50 q/ha) indicating an increase of 99.29, 83.63 and 75.72 per cent, respectively. Metalaxyl + mancozeb 68 WP + wheat straw (135.40q/ha) indicating an increase of 64.66 per cent.

Table 3: Effect of fungicides and mulches on fruit weight (g) of brinjal and per cent increase over check on fruit weight (g) of brinjal

Fungicide		Mulch					
Treatment	Dosage (%)	No Mulch (M_0)		Rice straw (M_1)		Wheat Straw (M_2)	
		Average weight (g)	Percent increase in weight	Average weight (g)	Percent increase in weight	Average Weight (g)	Percent increase in weight
Carbendazim 50 WP (F_1)	0.1	98.33	41.82	113.33	62.69	106.66	53.11

Copper oxychloride 50 WP (F_2)	0.3	97.66	40.80	107.66	54.55	104.66	50.24
Metalaxyl + Mancozeb 68 WP (F_3)	0.15	96.33	38.94	102.00	47.12	101.33	46.15
Propiconazole 25 EC (F_4)	0.15	103.66	48.80	119.00	70.82	109.66	57.42
Control/ water spray (F_0)	-	69.66	-	83.33	19.62	81.33	16.75

CD ($p \leq 0.05$)		for average weight	for percent increase in weight
Fungicide	:	0.90	0.97
Mulch	:	0.69	0.68
Mulch× Fungicide	:	1.60	1.50

Table 4: Effect of fungicides and mulches on fruit yield of brinjal and per cent increase in fruit yield over check of brinjal

Fungicide				**Mulch**			
Treatment	**Dosage (%)**	**No Mulch (M_0)**		**Paddy straw (M_1)**		**Wheat straw (M_2)**	
		Fruit yield (q/ha)	**Percent increase in yield**	**Fruit yield (q/ha)**	**Percent increase in yield**	**Fruit yield (q/ha)**	**Percent increase in yield**
Carbendazim (F_1)	0.1	139.30	69.40	187.30	127.77	163.88	99.29
Copper oxychloride50 WP (F_2)	0.3	130.50	58.50	169.28	105.86	151.00	83.63
Metalaxyl+Mancozeb 68 WP (F_3)	0.15	121.22	47.11	144.50	75.72	135.40	64.66
Propiconazole 25 EC (F_4)	0.15	154.92	88.40	215.20	161.70	172.97	110.34
Control/water spray (F_0)	-	82.23	-	111.35	35.34	102.34	24.45

C.D ($p \leq 0.05$)		for fruit yield	for percent increase in yield
Fungicide	:	0.21	0.21
Mulch	:	0.16	0.16
Fungicide ×Mulch	:	0.44	0.14

Integrated disease management is the frontline weapon against pathogen and is still one of the most widely used means of disease control. In present investigation, four fungitoxicants and two mulches were used *in vivo* against phomopsis fruit rot of brinjal. The results revealed that all the treatments had significant impact on the phomopsis fruit rot of brinjal over check. Among the fungitoxicants, propiconazole 25 EC which was at par with carbendazim 50WP proved to be most effective in reducing the disease by 81.88 and 81.42 per cent compared to check, followed by copper oxychloride 50WP which was at par with metalaxyl+ mancozeb 68WP exhibiting disease control of 77.51 and 75.31 per cent, respectively. Among the mulches applied rice straw proved to be most effective over check exhibiting disease control of 30.65 per cent followed by wheat straw which exhibited disease control of 16.24 per cent. Among the interactions propiconazole 25 EC + rice straw proved to be most effective over check exhibiting disease control of 97.21 per cent followed by propiconazole 25 EC + wheat straw (90.64%) which was at par with carbendazim 50 WP + rice straw (90.64%). Moreover, copper oxychloride 50 WP + rice straw exhibited disease control of 85.23 per cent which was at par with carbendazim 50 WP + wheat straw, copper oxychloride 50WP + wheat straw and metalaxyl + mancozeb 68 WP + rice straw exhibiting disease control of 84.37, 84.08 and 80.96 per cent, respectively. Metalaxyl + mancozeb 68 WP + wheat straw exhibited a disease control of 76.27 per cent over check. Observations with regard to the average fruit yield per hectare revealed that among the fungitoxicants, propiconazole 25 EC proved to be most effective as the average increase in fruit yield per hectare was recorded 88.40 per cent compared to check, followed by carbendazim 50 WP, copper oxychloride 50 WP and metalaxyl+ mancozeb 68WP exhibiting an increase of 69.40, 58.50 and 47.41 per cent, respectively. Among the mulches applied rice straw proved to be most effective over check as the average increase in fruit yield was recorded 35.34 per cent compared to check, followed by wheat straw exhibiting an increase of 24.45 per cent. Among the interactions propiconazole 25 EC + rice straw proved to be most effective over check, followed by carbendazim 50 WP + rice straw, propiconazole 25 EC + wheat straw, copper oxychloride 50 WP + rice straw, carbendazim 50 WP + wheat straw, copper oxychloride 50 WP + wheat straw, metalaxyl + mancozeb 68 WP + rice straw and metalaxyl + mancozeb 68 WP + wheat straw exhibited an increase of 161.70, 127.77, 110.34, 105.86, 99.29, 75.72 and 64.66 per cent, respectively. Various workers have also reported the efficacy of carbendazim 50 WP, copper oxychloride 50 WP, metalaxyl and mancozeb 75WP for management of phomopsis fruit rot of brinjal caused by *Phomopsis vexans* (Beura *et al*., 2008; Sharma *et al.,* 2012) [15].

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