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Efficacy of different soil amendments on disease incidence wilt of lentil

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Abstract

Lentil (*Lens culinaris Medikus.*) is most important pulse crop grown in India, which suffers economic losses due to wilt complex. Neem cake, mustard cake, linseed oil cake, sawdust and *Parthenium* compost were mixed individually in the sterilized soil filled pots, two weeks prior to sowing. Maximum disease control (42.85%) found in neem cake followed by Mustard (38.23%), *Parthenium* (32.90%), Linseed (28.57%) and Sawdust has effective in reducing wilt control (23.66%) in 2016- 17. Similar results were also observed in the year 2017-18. Disease incidence was maximum at 90 days after sowing as compared to 60 and 30 days after sowing in both the years' respectively.

Keywords: Isolation, disease incidence, percentage disease control, lentil

Introduction

Lentil (*Lens culinaris Medikus.*) is most important pulse crop in India, grown for dal making, culinary and for table purposes. It constitutes the main source of protein and several amino acids. It is a very cheap pulse and hence it is also referred as "Masur". The yield of lentil can be reduced considerably due to many diseases. Lentil is grown in diversified area and hence it succumbs to many fungal, bacterial and viral diseases in different geographical regions. The incidence of the wilt disease is increasing, causing substantial lentil yield losses. Yield losses due to lentil wilt reported by various workers, 50- 78 per cent yield loss under natural conditions at Madhya Pradesh by Khare *et al.* (1979 a, b) ^[11] and Agrawal *et al.* (1991), upto 50 per cent at Madhya Pradesh by Khare, (1980 and 1991) ^[10], 67 per cent wilt incidence reported by Vasudeva and Srinivasan (1952) at New Delhi, 25 to 50 per cent at Budelkhand region of Uttar Pradesh (Anonymous, 1999) ^[1], 12 per cent at North west Syria (Bayaa *et al.*, 1986 and 1994) ^[3], 13.2 per cent at South Syria (El-Ahmed and Mouselli. 1986 and 1987) ^[6, 7] and 70 per cent at Czechoslovakia (Bojdova and Siskny, 1990).

There is much said about the role of organic amendments in modification of physical, chemical and biological environment of soil through addition of decomposable organic matter. It improves the structure, texture, aeration and water holding capacity of soil and improves the development of root system. The biological environment also changes, due to intense microbial activities in the soil which is helpful for developing more antagonistic micro-organisms. The disease incidence is affected by various mechanisms operative in soil, host and pathogen. Considering the importance of these factors, the studies were carried out at the Department of Plant Pathology, College of Agriculture Kumarganj, Faizabad (20016-18) with a view to clarify the role of some oilseed cakes as a source of organic amendments, in reducing the severity and ultimately the losses caused by wilt causing organisms.

Materials and Methods

Isolation of *Fusarium oxysporum* f.sp. *lentis*

Small pieces of infected root 1–2 mm dimension from the advancing margin of the spot, adjacent to healthy portions were cut with blade, washed well in distilled water to remove dust adhered to the infected pieces. Pieces were dipped in 0.1 per cent mercuric chloride solution for 30 seconds and finally washed well in three changes of sterilized distilled water. The bits were then transferred to PDA medium in Petri plates with the help of inoculating needle under aseptic condition and incubated at $28 \pm 1^\circ\text{C}$. Pure culture was done by transfer of a pinch of mycelium on sterilized Potato Dextrose Agar medium in Petri plates and incubated in BOD.

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Effect of different soil amendments in net house condition

Soil were collected and sterilized in autoclave, filled (3Kg /pot) in earthen pots separately. Neem cake (2.77 gm./kg soil), mustard cake(2.53 gm./kg soil), linseed oil cake(2.28 gm./kg soil), sawdust(1.64gm./kg soil) and *Parthenium* compost (5 gm./kg soil) were mixed individually in the sterilized soil filled pots, two weeks prior to sowing. Control pots were filled with soil without adding amendments. The seeds of wilt susceptible variety of lentil (L 9-12) were sown in each pot (15 seed per pot) where finally 10 plants will be maintained. The experiment was conducted in CRD with three replications. First appearance of disease, disease incidence and per cent disease control were observed 30 and 60 days after sowing. Per cent disease incidence and per cent disease control were calculated by using following formula.

$$\text{Per cent disease incidence} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

$$\text{Per cent disease control} = \frac{C - T}{C} \times 100$$

Where,

C = Per cent disease incidence of control pots

T = Per cent disease incidence in treated pots

Results and Discussion

It is evident from the data that all five organic amendments tested reduced wilt incidence of Lentil significantly over check and minimum disease incidence was recorded in Neem oil cake (31.71%) @ 2.77 gm./kg soil followed by Mustard cake (34.29%)@ 2.53 gm./kg soil, *Parthenium* compost (37.55%) @5 gm./kg soil, Linseed cake (39.63%) @2.28 gm./kg soil and Sawdust (42.33%) @1.64gm./kg soil and as compared to control (55.44%). Neem oil cake has found significantly superior over all other treatments except mustard at 90 days of maximum disease control (42.85%) found in neem cake followed by Mustard (38.23%), *Parthenium* (32.90%), Linseed (28.57%) and Sawdust has effective in reducing wilt control (23.66%) in 2016- 17 (Table -1).

Table 1: Efficacy of organic amendment against *F. oxysporum* f. sp. *lentis* on disease incidence and percent disease control *in vivo* at 30 days,60 days and 90 days after sowing(2016-17)

Treatment	Disease incidence	Disease % control	Disease incidence	Disease % control	Disease incidence	Disease % control
	30days	30 days	60 days	60days	90days	90days
Neem oil cake @2.77gm/kg soil	3.96 (2.11)	42.85 (6.58)	7.92 (2.90)	42.85 (6.58)	31.71(5.67)	42.80 (6.57)
Mustard cake @ 2.53 gm./kg soil	4.28 (2.18)	38.23 (6.21)	8.57 (3.01)	38.16 (6.21)	34.29 (5.89)	38.14 (6.21)
Linseed cake@2.28 gm./kg soil	4.95 (2.33)	28.57 (5.39)	9.90 (3.22)	28.57 (5.38)	39.63 (6.33)	28.51 (5.38)
Sawdust@1.64gm./kg soil	5.29 (2.41)	23.66 (4.91)	10.58 (3.33)	23.66 (4.91)	42.33 (6.54)	23.64 (4.91)
Parthenium@5 gm./kg soil	4.65 (2.27)	32.90 (5.77)	9.31 (3.13)	32.82 (5.77)	37.25 (6.14)	32.81 (5.76)
Control	6.93 (2.72)	0.00 (0.71)	13.86 (3.78)	0.00(0.71)	55.44 (7.47)	0.00 (0.071)
SEM±	0.069	0.179	0.101	0.166	0.210	0.179
CD (0.05%)	0.211	0.552	0.312	0.510	0.646	0.553
CV	5.084	6.295	5.426	5.821	5.728	6.313

* Figure parenthesis is root transformed value will be give in only for PDC

Similar results were also observed in the year 2017-18, Neem oil cake has found significantly superior over all other treatments resulted minimum disease incidence was recorded in Neem cake (35.71%) followed by Mustard cake (37.26%) *Parthenium* compost (40.25%), Linseed cake (41.48%) and

Sawdust (46.38%) as compared to control (58.55%). Maximum disease control (39.00%) followed by Mustard (36.98%), *Parthenium* (31.50%) and Linseed (29.15%). Sawdust has least effective in reducing wilt control (21.91%) (Table 2).

Table 2: Efficacy of organic amendment against *F. oxysporum* f. sp. *lentis* on disease incidence and percent disease control *in vivo* at 30 days,60 days and 90 days after sowing (2017-18)

Treatment	Disease incidence	Disease % control	Disease incidence	Disease % control	Disease incidence	Disease % control
	30days	30 days	60 days	60days	90days	90days
Neemcake@2.77gm/kg soil	4.46 (2.23)	38.90 (6.27)	8.92 (3.06)	38.90 (6.27)	35.71 (6.01)	39.00 (6.28)
Mustard cake@ 2.53 gm./kg soil	4.60 (2.26)	36.98 (6.12)	9.31 (3.13)	36.23 (6.06)	37.26 (6.14)	36.36 (6.07)
Linseedcake@2.28 gm./kg soil	5.18 (2.38)	29.04 (5.43)	10.31(3.29)	28.97 (5.43)	41.48 (6.47)	29.15 (5.44)
Sawdust @1.64gm./kg soil	5.70 (2.49)	21.91(4.73)	11.50 (3.46)	21.23 (4.66)	46.38 (6.84)	20.78 (4.61)
Parthenium@5 gm./kg soil	5.00(2.34)	31.50(5.65)	10.00(3.24)	3.50(2.00)	40.25(6.38)	31.25(5.63)
Control	7.30 (2.79)	0.00 (0.71)	14.60 (3.88)	0.00 (0.71)	58.55 (7.67)	0.00 (0.71)
SEM±	0.074	0.158	0.107	0.147	0.219	0.157
CD	0.229	0.485	0.331	0.452	0.674	0.482
CV	5.333	5.663	5.562	6.074	5.752	5.662

* Figure parenthesis is root transformed value will be give in only for PDC

Disease incidence was maximum at 90 days after sowing as compared to 60 and 30 days after sowing in both the years.(Fig.1 and 2)



Fig 1: Efficacy of different soil amendments on disease incidence

Conclusion

Five organic amendments were evaluated against wilt of lentil which is found more or less effective. Maximum disease control (42.85%) found in neem cake followed by Mustard (38.23%), *Parthenium* (32.90%), Linseed (28.57%) and Sawdust has effective in reducing wilt control (23.66%) in 2016- 17. Similar results were also observed in the year 2017- 18. Disease incidence was maximum at 90 days after sowing as compared to 60 and 30 days after sowing in both the years.

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