



P-ISSN: 2349-8528
 E-ISSN: 2321-4902
 IJCS 2018; 6(1): 113-116
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 Received: 29-11-2017
 Accepted: 30-12-2017

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Effect of fly ash and FYM on foliar diseases of safed musali

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Abstract

Filed experiment was conducted effect of different treatment of FYM and Fly ash with interaction effect on incidence of foliar disease on safed musali. The study revealed that the combinations of different treatment of FYM and Fly ash at 59 DAS, 66 DAS, 73 DAS, 80 DAS incidence were recorded. The association of fungi with the foliar disease *Colletotrichum dematium* and *Phoma* sp., different doses of fly ash with FYM were evaluated. The lowest incidence and intensity of foliar diseases caused by *Phoma* sp. were observed in treatment M₁F₂ (9 kg FYM + 9 kg fly ash). The lowest incidence and intensity of foliar diseases caused by *Colletotrichum dematium* were observed in treatment M₁F₁ (9 kg FYM + 4.5 kg Fly ash). The highest incidence and intensity of foliar diseases observed in control.

Keywords: Colletotrichum dematium, Phoma sp., fly ash and FYM.

Introduction

Safed Musli (*Chlorophytum borivilianum*) is herbaceous plant belongs to the family Liliaceae. It is distributed mainly in the Southern Rajasthan, North Gujarat and Western Madhya Pradesh and some part of Vidrabha region. Now this crop has been brought under commercial cultivation in Gujarat, Rajasthan, Maharashtra, Karnataka, Madhya Pradesh, and Tamilnadu etc. (Bordia *et al.*, 1990) [2]. The species of Safed Musali is an important medicinal plant contains Carbohydrate (42%), Protein (8.9%), Root fiber (3-4%) and Saponin (2-17%). Saponons are the potent medicinal compounds in the roots. It is a herb with suberect leaves and tuberous root system and it holds an important position in Indian herbal medicine. The roots are widely used as a natural "sex tonic" and is an integral part of herbal drug formulations (Oudhia 2001) [5]. It has various therapeutic values as total rejuvenator, antioxidant and Immunomodulator. It is being used as an anti arthritic and anticancer drug. Because of its aphrodisial properties, it is mainly in identified as 'Herbal viagra'. Now a day's commercial cultivation of medicinal aromatic plants has increased and so as their pathological problems. The disease incidence increased with the rainfall and high humidity during August – September month, also yield of the crop is affected by foliar pathogens namely *Colletotrichum dematium* and *Phoma* sp., (Naidu, 2011) [4]. It was fact necessary to generate information for management of diseases by different doses of fly ash and FYM as alternative management strategy for foliar diseases of safed musli. For the management of diseases different doses of fly ash are used before sowing are applied for increases the yield and quality of produce and also reduces the foliar diseases.

Material and Methods

Experiment was conducted at Nagarjun Medicinal and Aromatic plant Garden, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola in FRBD design with 12 treatments and 3 replication. Evaluated the different treatment which effect of treatments on incidence and intensity of foliar disease caused by *Colletotrichum dematium* and *Phoma* sp.

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Treatment Details

Tr. No.	Treatment Combination	Treatment Details
T ₁	M ₀ F ₀	No FYM and Fly ash
T ₂	M ₀ F ₁	4.5 kg fly ash
T ₃	M ₀ F ₂	9 kg fly ash
T ₄	M ₀ F ₃	13.5 kg fly ash
T ₅	M ₁ F ₀	9 kg FYM
T ₆	M ₁ F ₁	9 kg FYM + 4.5 kg fly ash
T ₇	M ₁ F ₂	9 kg FYM + 9 kg fly ash
T ₈	M ₁ F ₃	9 kg FYM + 13.5 kg fly ash
T ₉	M ₂ F ₀	18 kg FYM
T ₁₀	M ₂ F ₁	18 kg FYM + 4.5 kg fly ash
T ₁₁	M ₂ F ₂	18 kg FYM + 9 kg fly ash
T ₁₂	M ₂ F ₃	18 kg FYM + 13.5 kg fly ash

Result and Discussion

Effect of treatments on incidence and intensity of foliar disease caused by *Colletotrichum dematium*

The disease was appeared on older leaves at lower portion on 10th September after 73 days after sowing. The result presented in Table 1 revealed that at 73 DAS and 80 DAS the results were statistically non-significant. The intensity of disease were also non-significant at 73 DAS and 80 DAS.

Effect of treatments on incidence and intensity of foliar disease caused by *Phoma* sp.

The disease was appeared on young leaves at upper portion on 27th August, after 59 days after sowing. The result presented in Table 2 revealed that at 59 DAS and 80 DAS results were statistically non-significant.

At 66 DAS results were statistically significant. The treatments of FYM, fly ash and their interaction were statistically significant. The lowest disease incidence were observed in M₁F₂ (9 kg FYM + 9 kg fly ash) 26.54% followed by M₁F₃ (9 kg FYM + 13.5 kg fly ash) 27.08%, M₁F₁ (9 kg FYM + 4.5 kg fly ash) 28.10%, M₂F₁ (18 kg FYM + 4.5 kg fly ash) 29.41%, M₂F₀ (18 kg FYM) 30.11%, M₂F₂ (18 kg

FYM + 13.5 kg fly ash) 31.07%. In FYM treatment the lowest disease incidence were observed in M₁ (9 kg FYM) 27.96 % followed by M₂ (18 kg FYM) 30.10%. In fly ash treatment the lowest disease incidence were observed in F₃ (13.5 kg fly ash) 29.36% followed by F₂ (9 kg fly ash) 29.72% and F₁ (4.5 kg fly ash) 29.91%.

At 73 DAS results were statistically significant. The treatments of FYM, fly ash and their interaction were statistically significant. The lowest disease incidence were observed in M₁F₂ (9 kg FYM + 9 kg fly ash) 32.78% followed by M₁F₁ (9 kg FYM + 4.5 kg fly ash) 33.25%, M₁F₃ (9 kg FYM + 13.5 kg fly ash) 34.00%, M₂F₁ (18 kg FYM + 4.5 kg fly ash) 34.47%, M₁F₀ (9 kg FYM) 34.92%, M₂F₀ (18 kg FYM) 35.19. In FYM treatment the lowest disease incidence were observed in M₁ (9 kg FYM) 33.74% followed by M₂ (18 kg FYM) 35.12%. In fly ash treatment the lowest disease incidence were observed in F₁ (4.5 kg fly ash) 34.21% followed by F₃ (13.5 kg fly ash) 34.80%, F₂ (9 kg fly ash) 34.93%.

The result presented in Table 3 revealed that at 59 DAS results were statistically significant.

The treatments of FYM, fly ash and their interaction were statistically significant. The lowest disease intensity were observed in M₁F₂ (9 kg FYM + 9 kg fly ash) 1.59% followed by M₁F₁ (9 kg FYM + 4.5 kg fly ash) 1.64%, M₁F₃ (9 kg FYM + 13.5 kg fly ash) 1.73%, M₂F₀ (18 kg FYM) 1.86%, M₁F₀ (9 kg FYM) 1.89% as compared to control (2.31%).

In FYM treatment the lowest disease incidence were observed in M₁ (9 kg FYM) 1.71% followed by M₂ (18 kg FYM) 2.00% as compared to control (2.07%). In fly ash treatment the lowest disease incidence were observed in F₂ (9 kg fly ash) 1.93% followed by F₃ (13.5 kg fly ash) 1.93% and F₁ (4.5 kg fly ash) 1.83% as compared to control 2.02%.

Effect of treatments on intensity of foliar disease caused by *Phoma* sp, the results state that at 66 DAS, 73 DAS and 80 DAS results were statistically non-significant.

Table 1: Effect of treatments on incidence and intensity of foliar disease caused by *Colletotrichum dematium*

Treatment detail	Per cent Incidence		Per cent Intensity	
	73 DAS (10 th Sept)	80 DAS (17 th Sept)	73 DAS 10 th Sept	80 DAS 17 th Sept
M ₀ F ₀	32.03 (34.47)**	40.52 (39.53)	2.17 (1.47)*	2.83 (1.68)
M ₀ F ₁	30.60 (33.58)	37.91 (38.00)	2.12 (1.46)	2.78 (1.67)
M ₀ F ₂	31.56 (34.17)	37.92 (38.00)	2.09 (1.45)	2.69 (1.64)
M ₀ F ₃	30.11 (33.28)	37.03 (37.48)	2.03 (1.42)	2.66 (1.63)
M ₁ F ₀	26.54 (31.00)	34.80 (36.15)	1.97 (1.40)	2.65 (1.63)
M ₁ F ₁	22.62 (28.39)	30.57 (33.56)	1.67 (1.29)	2.36 (1.54)
M ₁ F ₂	22.62 (28.39)	30.60 (33.58)	1.50 (1.22)	2.36 (1.54)
M ₁ F ₃	22.63 (28.39)	35.25 (36.42)	1.86 (1.36)	2.66 (1.63)
M ₂ F ₀	29.11(32.65)	35.70 (36.69)	1.97 (1.40)	2.78 (1.67)
M ₂ F ₁	29.61 (32.96)	34.80 (36.15)	2.02 (1.42)	2.62 (1.62)
M ₂ F ₂	28.10 (32.01)	34.35 (35.87)	2.10 (1.45)	2.72(1.65)
M ₂ F ₃	28.59 (32.32)	35.25 (36.42)	1.92 (1.39)	2.70(1.64)
F Test	NS	NS	NS	NS
SE(m)±	-	-	-	-
CD at 5%	-	-	-	-
FYM (A)				
M ₀	31.07 (33.88)	38.34 (38.25)	2.10 (1.45)	2.74 (1.66)
M ₁	23.60 (29.06)	32.80 (34.93)	1.75 (1.32)	2.51 (1.58)
M ₂	28.85 (32.49)	35.02 (36.28)	2.00 (1.41)	2.71 (1.65)
F Test	Sig	Sig	Sig	Sig
SE(m)±	0.40	0.36	0.03	0.01
CD at 5%	1.18	1.08	0.09	0.05
FLY ASH (B)				
F ₀	29.22 (32.72)	37.01 (37.47)	2.04 (1.43)	2.75 (1.66)

F1	27.61 (31.69)	34.43 (35.92)	1.94 (1.39)	2.59 (1.61)
F2	27.42 (31.58)	34.29 (35.84)	1.90 (1.38)	2.59 (1.61)
F3	27.10 (31.37)	35.84 (36.77)	1.94 (1.39)	2.68 (1.64)
F Test	Sig	Sig	NS	Sig
SE (m) ±	0.46	0.42	-	0.02
CD at 5%	1.36	1.25	-	0.06
A X B				
F Test	NS	Sig	Sig	Sig
SE (m) ±	-	0.73	0.06	0.03
CD at 5%	-	2.16	0.18	0.11

Figure in parenthesis ** indicate arc sin values, * indicate Square root values

Table 2: Effect of treatments on incidence of foliar disease caused by *Phoma* sp

Treatment detail	Percent incidence Days after sowing (DAS)			
	59 DAS	66DAS	73 DAS	80 DAS
MoF ₀	27.26 (31.47)*	32.97 (35.04)	36.09 (36.92)	40.09 (39.28)
MoF ₁	25.66 (30.43)	32.01 (34.45)	34.92 (36.22)	38.35 (38.26)
MoF ₂	21.61 (27.70)	31.56 (21.60)	36.36 (37.08)	38.35 (28.26)
MoF ₃	23.79 (29.19)	31.39 (34.07)	35.19 (36.38)	37.91 (38.00)
M ₁ F ₀	22.42 (28.26)	30.11 (33.27)	34.92 (36.22)	37.91 (38.00)
M ₁ F ₁	20.55 (26.96)	28.10 (32.01)	33.25 (35.21)	36.15 (36.96)
M ₁ F ₂	18.29 (25.32)	26.54 (31.00)	32.78 (34.93)	36.14 (36.95)
M ₁ F ₃	24.36 (29.57)	27.08 (31.35)	34.00 (35.67)	39.22 (38.77)
M ₂ F ₀	24.17 (29.45)	30.11 (33.27)	35.19 (36.38)	37.47 (37.74)
M ₂ F ₁	24.36 (29.57)	29.61 (32.96)	34.47 (35.95)	40.09 (39.28)
M ₂ F ₂	23.19 (28.78)	31.07 (33.87)	35.65 (36.66)	37.91 (38.00)
M ₂ F ₃	23.02 (28.67)	29.61 (32.96)	35.19 (36.38)	37.91 (38.00)
F Test	NS	Sig	Sig	NS
SE(m)±	-	1.72	1.94	-
CD at 5%	-	5.18	5.83	-
FYM (A)				
M ₀	24.58 (29.72)	31.98 (34.43)	35.64 (36.65)	38.68 (38.45)
M ₁	21.40 (27.56)	27.96 (31.92)	33.74 (35.51)	37.35 (37.67)
M ₂	23.68 (29.12)	30.10 (33.27)	35.12 (36.34)	38.35 (38.26)
F Test	Sig	Sig	Sig	Sig
SE(m)±	0.28	0.29	0.20	0.35
CD at 5%	0.84	0.87	0.60	1.03
FLY ASH (B)				
F ₀	24.62 (29.74)	31.06 (33.87)	35.40 (36.51)	38.49 (38.34)
F ₁	23.52 (29.01)	29.91 (33.15)	34.21 (35.80)	38.20 (38.17)
F ₂	21.03 (27.29)	29.72 (33.03)	34.93 (36.23)	37.47 (37.74)
F ₃	23.72 (29.15)	29.36 (32.80)	34.80 (36.15)	38.35 (38.26)
F Test	Sig	Sig	Sig	NS
SE (m) ±	0.32	0.34	0.23	-
CD at 5%	0.96	1.01	0.70	-
A X B				
F Test	Sig	Sig	Sig	Sig
SE (m) ±	0.56	0.59	0.41	0.70
CD at 5%	1.67	1.74	1.21	2.06

Figure in parenthesis * indicate arc sin values

Table 3: Effect of treatments on intensity of foliar disease caused by *Phoma* sp.

Treatment detail	Per cent intensity Days after sowing (DAS)			
	59 DAS	66DAS	73 DAS	80 DAS
MoF ₀	2.31 (1.52)*	2.71 (1.65)	3.37 (1.84)	3.59 (1.89)
MoF ₁	1.80 (1.34)	2.47 (1.57)	3.19 (1.79)	3.48 (1.87)
MoF ₂	2.17 (1.47)	2.43 (1.56)	3.13 (1.77)	3.38 (1.84)
MoF ₃	1.99 (1.41)	2.51 (1.58)	3.20 (1.79)	3.34 (1.83)
M ₁ F ₀	1.89 (1.37)	2.21 (1.49)	3.10 (1.76)	3.40 (1.84)
M ₁ F ₁	1.64 (1.28)	1.96 (1.40)	2.86 (1.69)	3.16 (1.78)
M ₁ F ₂	1.59 (1.26)	1.99 (1.41)	2.89 (1.70)	3.16 (1.78)
M ₁ F ₃	1.73 (1.32)	2.23 (1.49)	2.95 (1.72)	3.28 (1.81)
M ₂ F ₀	1.86 (1.36)	2.32 (1.52)	3.16 (1.78)	3.38 (1.84)
M ₂ F ₁	2.03 (1.42)	2.36 (1.54)	3.04 (1.75)	3.29 (1.81)
M ₂ F ₂	2.04 (1.43)	2.57 (1.60)	3.24 (1.80)	3.52 (1.88)
M ₂ F ₃	2.07 (1.44)	2.47 (1.57)	3.22 (1.79)	3.40 (1.84)
F Test	Sig	NS	NS	NS
SE(m)±	0.07	-	-	-

CD at 5%	0.23	-	-	-
FYM (A)				
M0	2.07 (1.44)	2.53 (1.59)	3.22 (1.80)	3.45 (1.86)
M1	1.71 (1.31)	2.10 (1.45)	2.95 (1.72)	3.25 (1.80)
M2	2.00 (1.41)	2.43 (1.56)	3.16 (1.78)	3.40 (1.84)
F Test	Sig	Sig	Sig	Sig
SE(m)±	0.02	0.02	0.01	0.01
CD at 5%	0.06	0.08	0.05	0.05
FLY ASH (B)				
F0	2.02 (1.42)	2.41 (1.55)	3.21 (1.79)	3.46 (1.86)
F1	1.83 (1.35)	2.21 (1.49)	3.03 (1.74)	3.31 (1.82)
F2	1.93 (1.39)	2.27 (1.51)	3.08 (1.76)	3.36 (1.83)
F3	1.93 (1.39)	2.33 (1.53)	3.12 (1.77)	3.34 (1.83)
F Test	Sig	Sig	Sig	Sig
SE (m) ±	0.02	0.03	0.02	0.02
CD at 5%	0.07	0.09	0.06	0.06
A X B				
F Test	Sig	Sig	Sig	Sig
SE (m) ±	0.04	0.05	0.03	0.03
CD at 5%	0.12	0.16	0.10	0.11

Conclusion

From the analysed data it shows that the treatment M₁F₁ (9 kg FYM + 4.5 kg fly ash) and M₁F₂ (9 kg FYM + 9 kg fly ash) are standered dose for management of foliar diseases and increase the yield , Fresh weight, dry weight, and mainly saponin content of safed musali.

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