

WHITE MOLD ON COMMON BEAN RELATED TO PLANT DENSITY, FUNGICIDE, IRRIGATION AND APPLICATION OF *TRICHODERMA* SPP.

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Common beans are staple food in Brazil. Bean diseases caused by soilborne pathogens, like white mold by *Sclerotinia sclerotiorum*, have increased in the last years, especially during the “winter season”, in the irrigated areas, because the growers do not properly manage the irrigation, leading to high relative humidity and soil moisture conditions. No single treatment provides a satisfactory disease management, but some practices used simultaneously may be effective to control white mold. Low temperature, high humidity and plant canopy and/or soil surface wetting favour disease progress. Therefore, wider row and/or plant spacing may provide less favourable environmental conditions due to better light penetration into plant canopy and soil, and more ventilation.

The objective of this work was to study the association of control strategies of bean white mold in an irrigated area, including biological control, plant density adjustments, water management and fungicide application.

Materials and Methods

Two field experiments were carried out in an experimental field in Viçosa (MG), Brazil. This field is naturally infested with sclerotia of *S. sclerotiorum*. The trials were conducted as a 2 x 2 x 3 x 4 factorial in the randomized complete-block design: two irrigation frequencies (seven and 14 days), two plant densities (rows spaced 0.5 m apart with 6 or 12 plants/m), three disease control treatments (no control, application of fluazinam, application of *Trichoderma* spp.) and four replications. Seeds of the bean cultivar Talismã were sown on May (end of fall) of 2004. The trials were sprinkler irrigated. The fungicide fluazinam and conidial suspensions of *T. harzianum* and *T. stromaticum* (0.5 L a.i./ha) was applied at 45 (early bloom) and 55 days after emergence (DAE). An area of 1.2 m² of each plot was separately harvested for disease evaluation at 90 DAE. Incidence of white mould was evaluated considering % of plants with symptoms on stem or branches. Plants were rated for severity with a scale from 0 to 4 (Hall and Phillips, 1996). Yield, number of pods/plant and seeds/pod and 100-seeds weight were also evaluated.

Results and Discussion

Main results are presented in Table 1. No significantly effect of the irrigation frequencies was observed either on the disease development or on the bean yield, probably due the untypical rain occurred during the experiments. Higher disease severity was observed in the plant density 12 plants/m, compared to 6 plants/m. Some yield components were higher in the plant density 6 plants/m, compared to 12 plants/m, but no differences on yield were observed for both plant densities.

These results confirm the viability of using lower plant density in sclerotia infested fields to control bean white mold. The fungicide fluazinam was efficient to control the disease and to

improve the bean yield, compared to the treatments with no application of fungicide and application of *Trichoderma* spp. New tests will be carried out with *Trichoderma* isolates more adapted to temperatures under 20°C.

Table 1 - Sclerotia weight, white mold incidence and severity (Mckinney index) for different irrigation regimes, plant densities and application of fungicide and *Trichoderma* spp.

Treatments	Sclerotia weight ¹ (g)	Incidence (%)	Mckinney index ² (%)	Yield (kg/ha)
Experiment 1				
Irrigation 14 days	3.80	95.80	64.06	1297.00
Irrigation 7 days	3.70	95.80	57.00	1471.00
Difference	0.10 ns	0.00 ns	7.06 ns	242.00 ns
6 plants/m	3.44	94.97	55.31	1382.00
12 plants/m	4.07	96.63	65.74	1.385.00
Difference	0.63 ns	1.66 ns	10.43 **	3.00 ns
No <i>T. harzianum</i> and fluazinam	4.59 A	98.34 A	67.59 A	1230.00 B
<i>T. harzianum</i>	5.25 A	96.96 AB	64.86 A	1116.00 B
Fluazinam	1.41 B	92.10 B	49.14 B	1805.00 A
CV (%)	45.05	6.63	17.04	23.40
Experiment 2				
Irrigation 14 days	3.98	92.75	55.60	1272.00
Irrigation 7 days	4.33	92.29	60.02	1143.00
Difference	0.35 ns	0.46 ns	4.42 ns	129.00 ns
6 plants/m	4.66	93.58	57.77	1021.00
12 plants/m	3.64	94.46	57.85	1396.00
Difference	1.02 ns	0.88 ns	0.08 ns	375.00 ns
No <i>T. stromaticum</i> and fluazinam	4.47 AB	95.63 A	62.47 A	997.00 B
<i>T. stromaticum</i>	5.76 A	93.25 A	63.06 A	943.00 B
Fluazinam	2.24 B	93.19 A	47.89 B	1684.00 A
CV (%)	64.60	7.55	19.26	33.78

¹ Sclerotia bigger than 2 mm attached to bean pods and mixed to the seeds;

² ID (disease index, %) = $\frac{\sum (\text{disease rate} \times \text{number of plants with this rate})}{(\text{total number of plants} \times \text{maximum value of disease scale})} \times 100$

Irrigation regimes and plant densities were compared by Test F; means for application of fungicide and *Trichoderma* spp. and treatment control were compared by Tukey (5%); ns e ** = not significant and significant (1%), respectively.

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Reference

Hall, R.; Phillips, L.G. 1996. Evaluation of parameters to assess resistance of white bean to white mold. Ann. Rep. Bean Improv. Coop. 39, 306-307.