

Effects of fungicide seed treatments on germination of *Claviceps purpurea* sclerotia to the field



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The ergot sclerotia in seed lots can introduce disease in healthy fields. What is the capacity of fungicide treatments applied to seeds to reduce this risk of contamination?

Previous trials in controlled conditions permit to identify treatments with an anti-germ effect, the present study aims to evaluate their effectiveness in field conditions.

MATERIALS AND METHODS

Six origins of wheat sclerotia are subjected to an application of fungicide seed treatments in a mixture with wheat seeds (see Table I). Only sclerotia are buried into the soil for the test.

T1 and T2 modalities had presented very good performances in controlled conditions, they were more modest for T3 (Maunas et al, 2012).

Various tests are conducted in the field, according to the distribution of lots (different origin) and modalities indicated in Table II. The sclerotia are sown in line in the autumn, according to a block randomization plan (4 repeats), an experimental plot corresponds to a seeding line of 50 sclerotia.

Table II: Distribution of sclerotia origins per site and conditions.

Experimental site	Sclerotia origin	Sowing date	Control untreated	T1	T2	T3
Boigneville (ARVALIS - 91)	A, B and C	04/11/13	x	x	x	x
Montardon (ARVALIS - 64)	A and B	09/12/13	x	x	x	x
Boigneville (ARVALIS - 91)	1 and 3	31/10/14	x	x	x	
Montardon (ARVALIS - 64)	1 and 2	24/11/14	x	x	x	x
Bourges (FNAMS - 18)	1 and 2	08/11/14	x	x	x	
Troyes (FNAMS - 10)	2 and 3	06/11/14	x	x	x	

Table I: fungicide treatments studied

Modality	Specialties	quantities of active substances per quintal
T1	Vitavax 200 FF	carboxine (60 g) + thirame (60 g)
T2	BAS 59101F	prochloraze (12 g) + triticonazole (4 g)
T3	Vibrance Gold	fludioxonil (5 g) + difénoconazole (5 g) + sedaxane (10g)



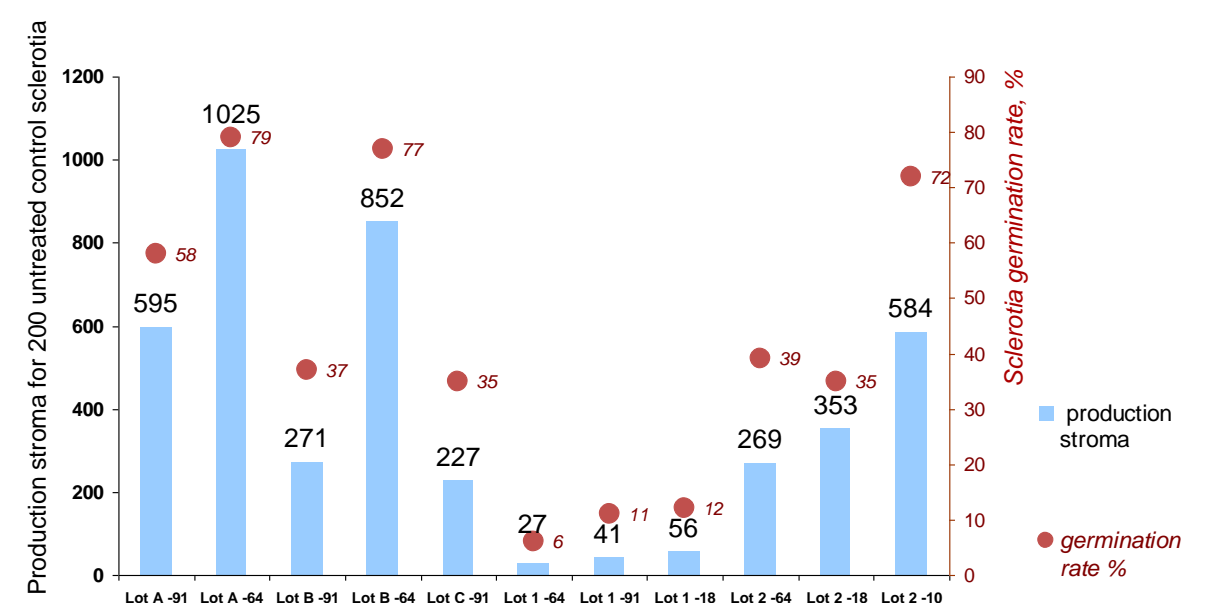
Observations relate to the production of stroma (or heads perithecia) that emerge from the soil and the rate of sclerotia germinated. The results presented relate to the data collected at the peak of germination of the untreated control.

RESULTS

Untreated sclerotia from different origin have a very variable stroma production: 0 (lot 3, eliminated from the analysis) to 1000 stroma for 200 sclerotia sown, with an average germination rate of 42% (range 6-79%). The number of stroma produced by a germinated sclerotium is around 4, but this average may vary within a batch according to the implantation conditions (3 to 5 for example for origin 2 located on 3 sites).



Figure 1: Production stroma for 200 untreated control sclerotia and sclerotia germination rate (%) by origin and sowing site.

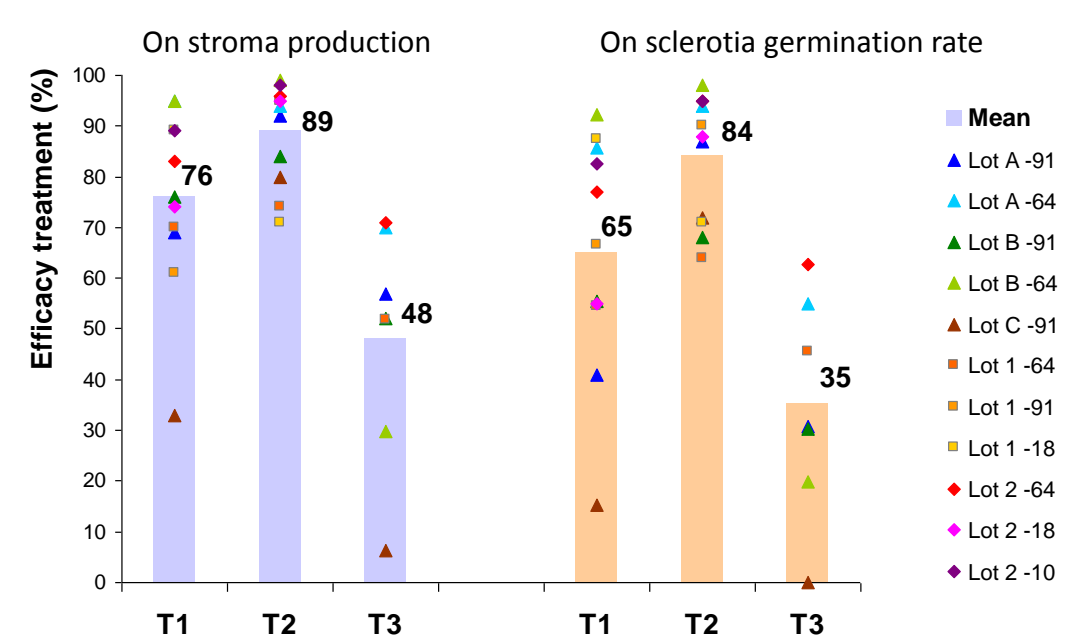


T1 can significantly reduce the number of emerging stroma with an average efficiency of 76% (from 33 to 95% depending on the situation). The sclerotia germination rate is reduced by 65% on average.

T2 has the best and the most regular efficiency. It reaches 89% efficiency (from 71 to 99%) for the stroma production and 84% for the sclerotia germination. This efficiency, although high, have never been total (11 cases).

T3 is also active but its performances are much lower. Producing stroma is halved and the effectiveness on the sclerotia germination reached only 35% (7 cases).

Figure 2: Efficacy treatment (%) on the stroma production and sclerotia germination rate (11 cases).



CONCLUSION

This study confirms the usefulness of two fungicides seed treatment: the first containing prochloraze and triticonazole, and the second based on carboxin and thiram.

They highly reduce sclerotia germination sown in the spring and can thus contribute to the fight against the introduction of rye ergot in healthy fields through contaminated seeds. Their protection is however not complete and it can therefore be considered only in addition to sorting operations that remain the 1st control solution.

These treatments, however, will have no effect on the inoculum already present in soil. In the case of contaminated soil, an adaptation of the ground work remains to be considered.

Bibliographie MAUNAS L., ROBIN N., MAUMENE C., 2012 - Effets de différents traitements de semences fongicides sur la germination en conditions contrôlées de sclérotés de *Claviceps purpurea*. 10^{ème} Conférence internationale sur les maladies des plantes, TOURS - 3-5 décembre 2012.

