MICROPLASTIC FREE SEED COATING WITH EXILVA®

REDUCED DUSTING OF MICROPLASTIC FREE STARCH BASED SEED COAT LIQUIDS

TECHNICAL BULLETIN

Seed coat liquids are tailored to include seed enhancement products that increase flowability, improve seed appearance and reduce dusting during storage, transport and sowing.

A typical seed coat liquid formulation consists of a binder, film former, rheology additive, colorant, filler, anti-foaming agent and a biocide. These formulations are primarily used as a carrier for additives such as biostimulants and plant protection products.

Due to regulatory changes, there is need to replace synthetic ingredients in these formulations with biodegradable and biobased alternatives. The aim is to develop Microplastic Free and Organic Seed coatings.

In this study, we show that adding Exilva as a co-binder/film former on top of a seed coat liquid with starch-based binders reduces the dust-off rate of the seeds to levels below that of treated seeds without Exilva. Using Exilva reduces the dust-off rate of the starch-based binders to levels below that obtained by the synthetic binder tested based on Polyvinyl acetate.

EXPERIMENTAL

The starch-based binders used in the different formulations reported are Corn Starch and Glucose Syrup. Formulations with and without Exilva were prepared as shown in Table 1. Exilva was added without changing the amount of the other additives used. In an optimized formulation, one should replace 25 wt% water with the 25 wt% Exilva F 01-L and not only add Exilva on top of the other ingredients.

TABLE 1. *Formulation for starch based seed coat liquids.*

MATERIAL	FUNCTION	CORN STARCH (g)	CORN STARCH + EXILVA (g)	GLUCOSE SYRUP (g)	GLUCOSE SYRUP + EXILVA (g)
Water	Solvent	45	45	25	25
Exilva F 01-L	Co-binder/ rheology additive	0	25.2	0	25.2
Silfoam SRE	Antifoam	0.1	0.1	0.1	0.1
Rocima	Biocide	0.2	0.2	0.2	0.2
Corn starch	Binder	5	5	0	0
Glucose Syrup	Binder	0	0	25	25
Agrocer red	Color	14.5	14.5	14.5	14.5
Quartz	Filler	10	10	10	10
Total		**74.8**	**100**	**74.8**	**100**

Corn seeds are selected for this study.

Maxim XL, a flowable concentrate (FS), is used as the plant protection product for all the seed treatments.

Following are the application rates used to treat the corn seeds:

- Dosage of the Maxim XL for corn used is 107.34 g/100 kg seed
- Dosage of seed coat liquid (binder) for corn used is 2.4 g/kg
- Slurry rate for corn used is 13 g/kg seeds

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APPEARANCE OF THE TREATED SEEDS

All treated seeds looked similar in appearance. No differences could be observed as shown in Figure 1.

FIGURE 1. *Pictures of corn seeds after coating with the treatments containing Corn Starch + Exilva F 01-L (left) and Glucose syrup + Exilva F 01-L (right) as the main binder.*

DUST OFF RATES OF THE TREATED SEEDS

The results obtained from the treatments in table 1 are also compared to the results obtained by treating the seeds with Maxim XL as the crop protection agent but using Sepiret as the synthetic binder at the same application rates. Sepiret is a commercial seed coat liquid consisting mainly of Polyvinyl acetate.

Figure 2 (next page) shows the values obtained using a Heubach Dustmeter on the following set of seeds:

- Untreated corn seeds
- Corn seeds treated with one of the following:
    - Maxim XL and Seed coat liquid consisting of Corn starch as binder
    - Maxim XL and Seed coat liquid consisting of Corn starch as binder with Exilva as co-binder
    - Maxim XL and Seed coat liquid consisting of Glucose syrup as binder
    - Maxim XL and Seed coat liquid consisting of Glucose syrup as binder with Exilva as co-binder
    - Maxim XL and Sepiret, a commercial seed coat liquid consisting of Polyvinyl acetate as binder

The market requirement for dust-off rates which is also the maximum allowed dust-rate for corn seeds is included in the graph for reference.

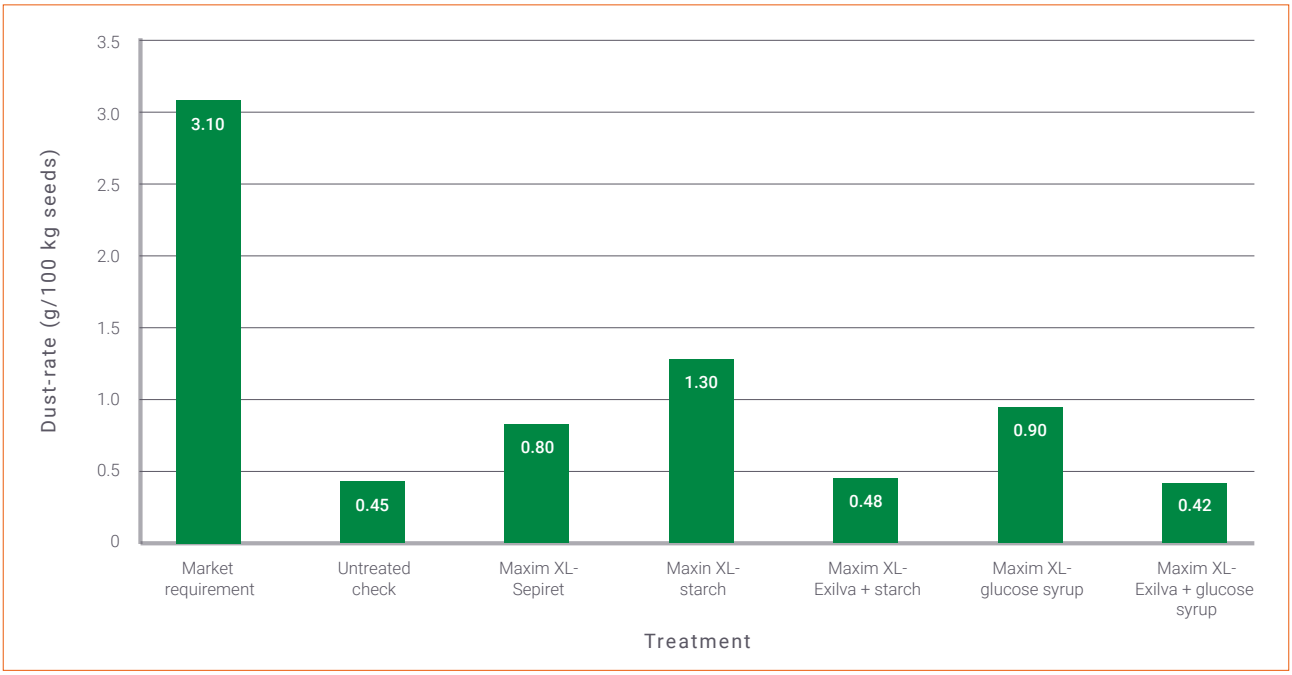

FIGURE 2. *Average mass of the dust gathered on the filter in a dusting test for corn seeds. The graph shows the results for the different treatment as well as for the untreated seeds.*

When the starch-based binders are used in the seed coat liquids they lead to dust-off rates below the maximum level and within the market requirement. The dust-off rates are however above the values obtained with the seeds treated using the synthetic binder.

Adding Exilva as a co-binder to the starch-based systems reduced the dust-off by 50 to 60 % as compared to the same systems without Exilva. The resulting treatments with Exilva were also around 40 to 50 % lower than the values obtained with the seeds treated with the synthetic binder and very similar to values obtained from untreated seeds.

Seeds treated with starch-based binders and Exilva showed slight reduction (not statistically significant) in flowability rates. This implies that the formulation work in this case is not optimal. To improve the flowability and obtain values closer to that of the untreated seeds, the concentration of Exilva in use could be optimized or additives that help improve this parameter could be included in the formulation.

All seeds germinated under optimal conditions. Using Exilva did not have any negative effect on germination.

SUMMARY

Addition of Exilva as a co-binder and film former with starch-based binders in seed coat liquids reduced the dust produced by the biodegradable and biobased binders leading to lower values than the reference synthetic binder. No negative impact on germination of the seeds was observed but the flowability of the seeds was slightly reduced.

All in all, Exilva can help enhance and develop microplastic free seed coatings.

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