Borregaard

VANISPERSE CB IN BIOCONTROL

Superior dispersant and UV-protectant for biocontrol formulations

Vanisperse® CB is a superior dispersant for liquid and solid crop protection products (SC, WP, WG). It facilitates optimal processability and storage stability of the formulated products and provides extended efficacy of the spray. Vanisperse CB protects active ingredients from harmful solar radiation.

PURPOSE

Showcase examples of the benefits of using Vanisperse CB as a binder, dispersant and UV protectant in solid biopesticide formulations.

RESULTS

Vanisperse CB exhibits excellent dispersion ability exemplified by the suspension stability of solid formulations prepared both with Bacillus thuringiensis and Beauveria bassiana. The UV-absorbance capabilities of Vanisperse CB are also demonstrated.

Vanisperse CB provides

- Good dispersibility and high suspensibility
- Excellent binding in granulation processes
- High UV-absorption capabilities

PROCEDURE

Example 1 Lignosulfonate in a WG with Beauveria bassiana

A formulation of 70 % B. bassiana was prepared using 28% Vanisperse CB and 2% wetting agent. The formulation was spray dried at 60°C inlet temperature and 30°C outlet temperature. The suspension stability of the formulation was tested according to MT 15.1.

Example 2 Lignosulfonates in a WG of Bacillus thuringiensis

A formulation of 50% B. thuringiensis and 30% of an additional active ingredient was prepared with 17% Vanisperse CB and 3% maltodextrin. The two active ingredients and the maltodextrin were dry mixed and transferred to a fluidised bed granulator. A solution of 25% Vanisperse CB in water was sprayed into the fluid bed granulator to agglomerate the dry ingredients. The fluidised bed was operated at 35°C - 40°C. The suspension stability and the dispersibility of the formulation were tested according to MT 15.1 and MT 174.

Example 3 UV-absorbance of lignosulfonates

Solutions of lignosulfonates in water were prepared in 0,005% and 0,05% concentrations. In both solutions 2 drops of 5M HCl were added during dilution to lower the pH of the solution. The UV-absorbance and transmittance of the two solutions were measured.

Table 1: Fresh suspensibility of WG of B. bassiana and Vanisperse CB

Dispersant	Suspensibility
Vanisperse CB	88.4%

Table 2: Fresh suspensibility and dispersibility of WG of B. thuringiensis and Vanisperse CB

Test	Performance
Suspensibility	85%
Dispersibility	15-20 inversions

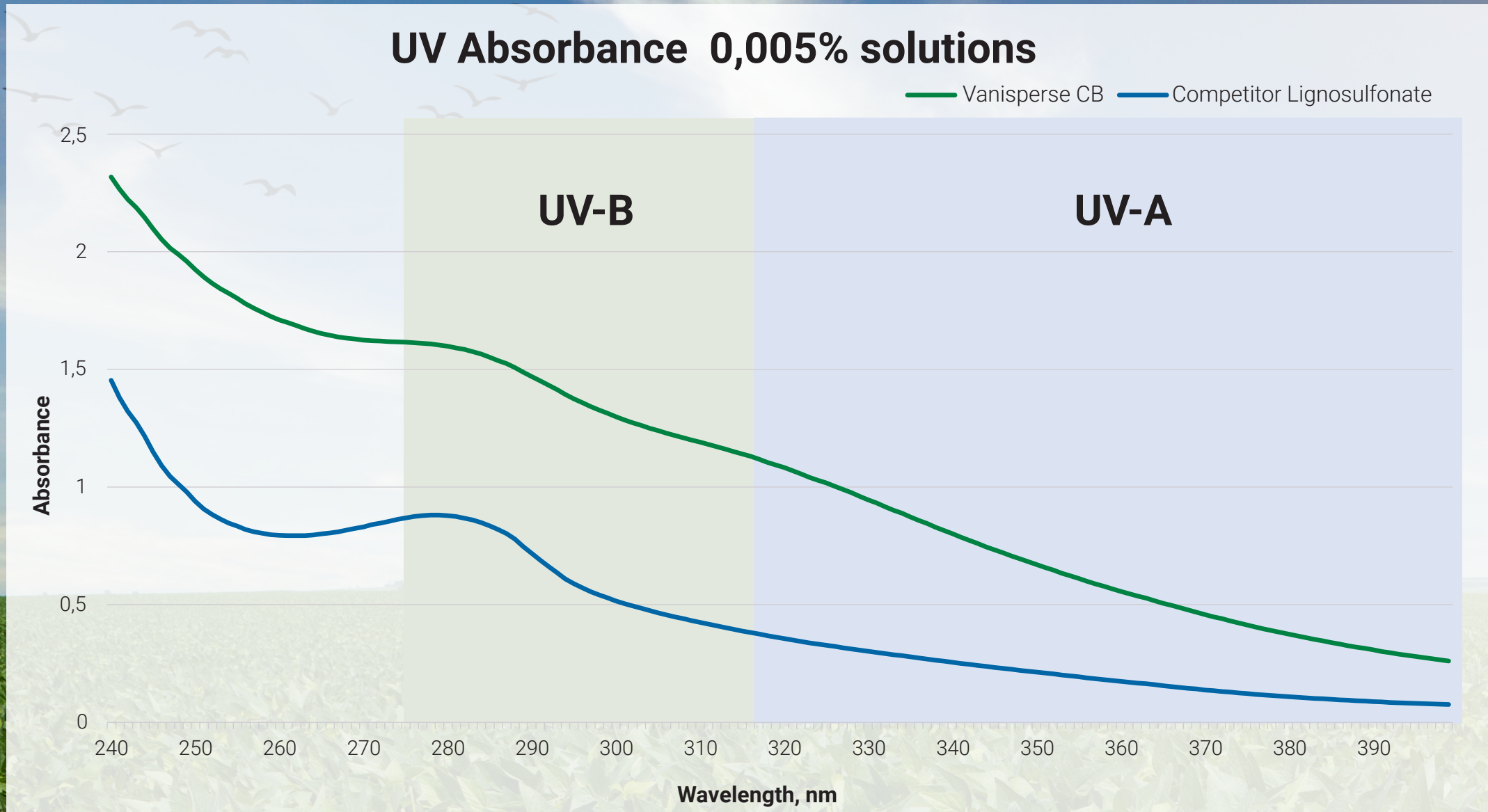

Figure 1: The UV absorption measured in 0,005% solutions of Vanisperse CB and a competitor lignosulfonate from 400nm -240 nm.

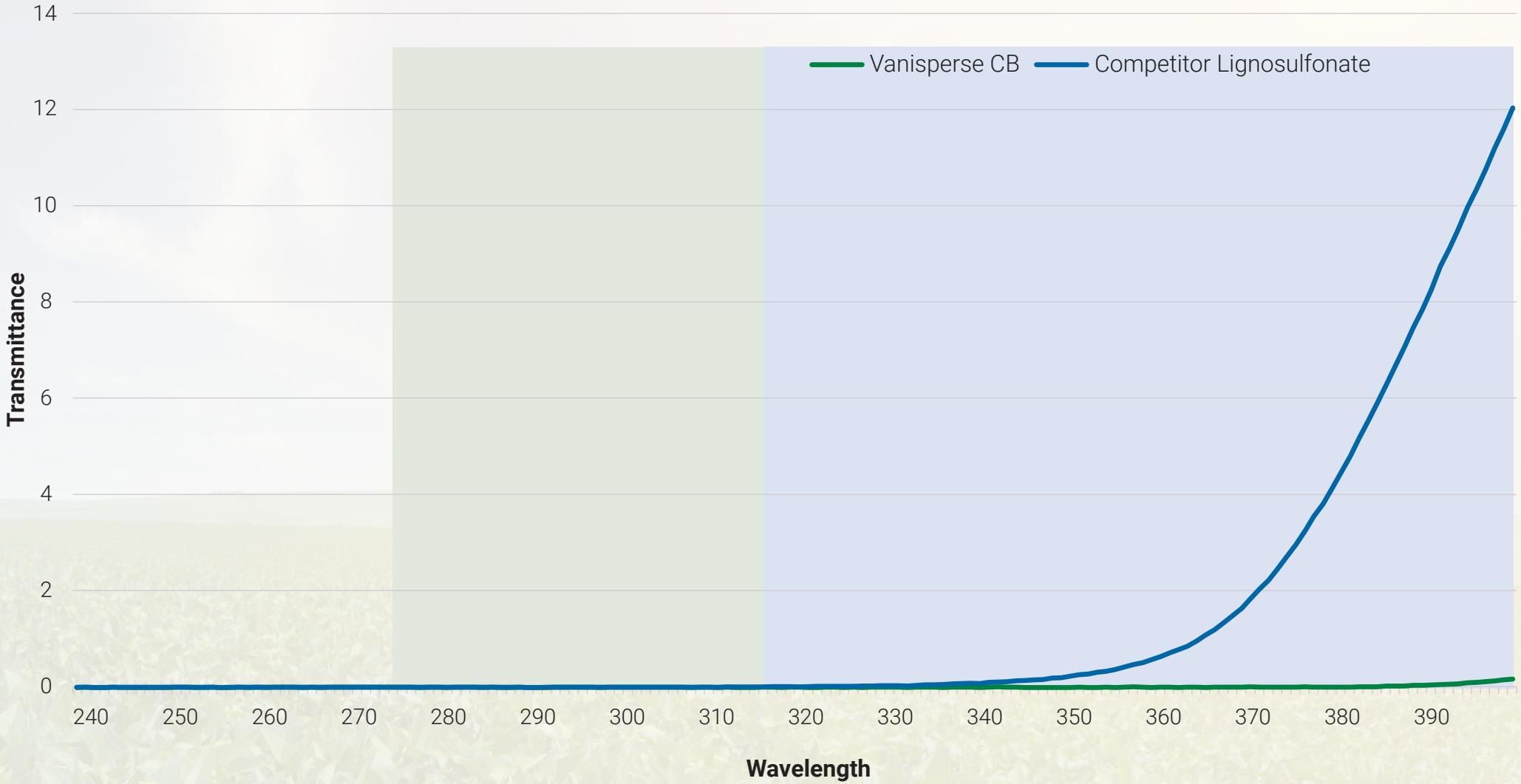

Figure 2: The UV transmission was measured in 0,05% solutions of Vanisperse CB and a competitor lignosulfonate from 400nm - 240 nm.

DISCUSSION

Example 1 Lignosulfonate in a WG with Beauveria bassiana

The temperature during preparation of these spray dried granules was very low. This was due to the temperature sensitivity of the active ingredient. Lignosulfonates may contribute to protection of the active ingredient during spray drying. Assays were done after the drying process to confirm the viability of the active ingredient though the treatment. The suspension stability of the WG of B. bassiana was measured to be 88% in standard hard water. This demonstrates the superior dispersion ability of Vanisperse CB of the conidia of B. bassiana.

Example 2 Lignosulfonates in a WG of Bacillus thuringiensis

The granules prepared by fluid bed granulation of B. thuringiensis and Vanisperse CB display good performance both in suspension stability as well as dispersibility. The suspension stability was measured at 85%, and the granules could be dispersed within 15-20 inversions. By preparing granules by fluid bed granulation the dusting is reduced compared to a WP, which is very important from a SHE perspective. Still, the granules are easily disintegrated due to the combined effect of the binding and dispersing abilities of Vanisperse CB.

Example 3 UV-absorbance of lignosulfonates

UV-radiation can be harmful to several types of biocontrol agents. This in-vitro experiment is illustration of the potential benefit of adding Vanisperse CB to a formulation containing a UV-sensitive active ingredient. Most lignosulfonates absorb UV-radiation, but to different degrees depending on the structure of the molecule. Vanisperse CB has the highest absorption of UV-radiation compared to other Borregaard lignin products and competitive lignosulfonates and kraft lignin. The absorbance curve over wavelength of Vanisperse CB compared to a competitor lignosulfonate is illustrated in the 0,005% solution. In the 0,05% solution no transmittance can be observed over the range of wavelength 400 nm - 240 nm in Vanisperse CB. The UV-protection from Vanisperse CB has also been tested in-vivo for B. thuringiensis and is described in US patent no. 5,529,772. The Bt toxin remained efficient for approximately 7 days longer when formulated with Vanisperse CB compared to the unprotected toxin.

CONCLUSIONS

Vanisperse CB brings great value to a biocontrol formulation, especially for UV sensitive active material. The combined functions of dispersing, binding and UV-protectant offered by Vanisperse CB is unique. The formulation examples prove the performance of Vanisperse CB in granulated formulations prepared by two different granulation procedures and for two different active ingredients.

This work was performed by the Borregaard Agricultural laboratory team.

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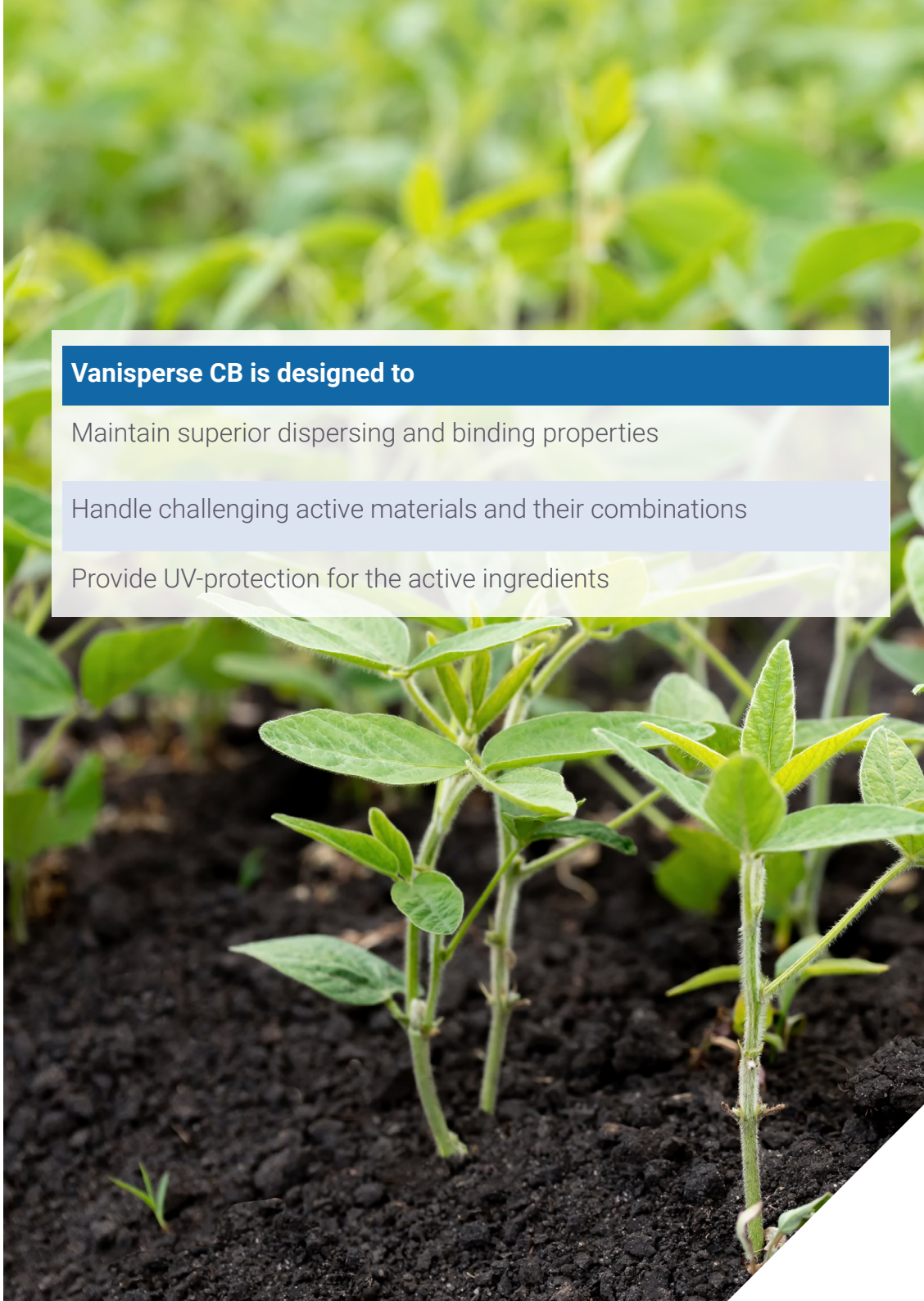

Vanisperse CB is designed to
Maintain superior dispersing and binding properties
Handle challenging active materials and their combinations
Provide UV-protection for the active ingredients