

# Higher performance in cold temperatures with Intra Eco Shield

## Cucumber trial with low temperatures during night and day



Written by Jonice van Oss MSc and Casper van der Heijden Bsc

Due to the risen energy prices, growers are searching for ways to reduce their costs. One of those ways is to maintain a reduced temperature setting inside the greenhouse for various crops. With this thought, the question raised if Intra Eco Shield could support the plant against the negative effect of lowering the heating temperatures during crop development. We turned the heating down and exposed cucumber plants to cold temperatures, creating temperature stress. The trial was performed at the horticulture facility at Intracare from the beginning of October until the end of December 2022.

Intra Eco Shield is a liquid plant enhancer, it contains a unique formula with a high concentration of plant-available orthosilicic acid. It supports the plant's nutritional uptake, enhances water management and increases stress tolerance towards harsh weather conditions.



	Row 1	Row 2	Row 3	Row 4
1	Irrigation+foliar	Control	Irrigation	Control
2	Irrigation+foliar	Control	Irrigation	Control
3	Irrigation+foliar	Control	Irrigation	Control
4	Irrigation+foliar	Control	Irrigation	Control
5	Irrigation+foliar	Control	Irrigation	Control
6	Irrigation+foliar	Control	Irrigation	Control
7	Irrigation+foliar	Control	Irrigation	Control
8	Irrigation	Foliar	Irrigation+foliar	Foliar
9	Irrigation	Foliar	Irrigation+foliar	Foliar
10	Irrigation	Foliar	Irrigation+foliar	Foliar
11	Irrigation	Foliar	Irrigation+foliar	Foliar
12	Irrigation	Foliar	Irrigation+foliar	Foliar
13	Irrigation	Foliar	Irrigation+foliar	Foliar
14	Irrigation	Foliar	Irrigation+foliar	Foliar
15	Irrigation	Foliar	Irrigation+foliar	Foliar

Figures 1 & 2. Figure 1 (left) picture taken of the greenhouse set-up at Intracare. Figure 2 (right) Schematic set-up of the trial.

## 1. Growing conditions and trial set-up

The ideal temperature for cucumber plants is between 23-25 degrees Celsius during the day and during the night not lower than 18 degrees. In our set-up, we maintained a day temperature of around 20 degrees and a night temperature of around 17 degrees. We made sure temperatures would not drop below 15 degrees, since cucumber plants will stop their production below 15 degrees.

Intra Eco Shield was dosed 1 litre per hectare a week applied through irrigation, foliar, or a combination of both (irrigation + foliar). Application with Intra Eco Shield through irrigation will be continuous and foliar application will be once a week. The final amount of Eco Shield applied is the same for all methods. Groups were divided over 4 rows with multiple dataloggers to keep track of temperature (**Figures 1 & 2**).

## 2. Highlight of results

### 2.1. Cucumber yield

Results of the cold stress trial seem to show a trend where the application of Intra Eco Shield gives more cucumber yield. An increase of 5% was reached with irrigation and 18% with the foliar application (**Figure 3**). A remarkable thing is that a combination of irrigation and foliar application of Intra Eco Shield does not equal extra benefits, this looks to be a clear case of less is more.

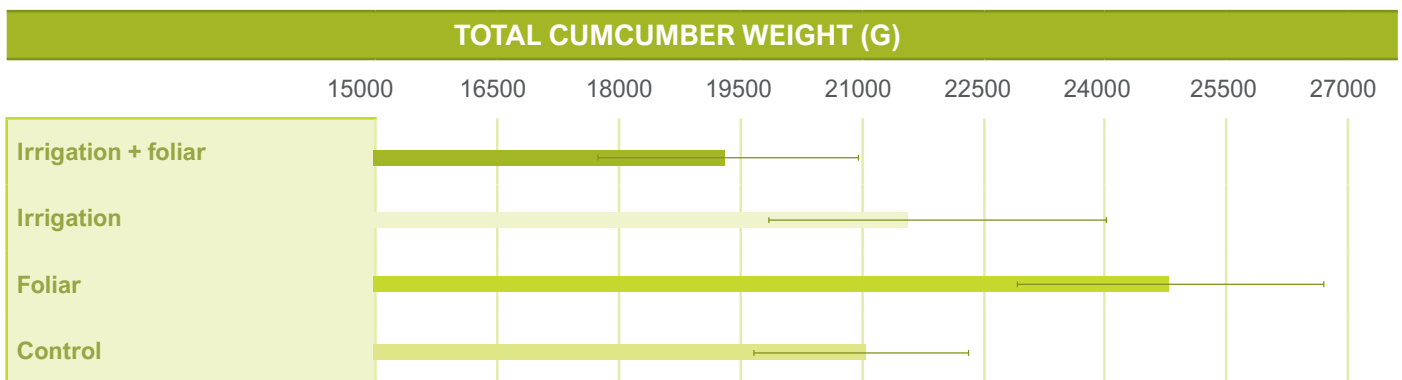


Figure 3. Total weight of cucumber harvest (g) per Intra Eco Shield application and control



## 2.2. Plant sap results

At the beginning and at the end of the trial plant sap analyses were performed. Leaf samples were taken and analysed for a broad spectrum of nutrients (**Table 1**).

The results show that nutrients are more balanced and better used when compared with the control. For example, the K:Ca was more balanced and manganese (Mn) uptake was increased. These findings are the result of the application of Intra Eco Shield. In addition, the less is more theory is also visible. Compared to the singular applications, Mn did not increase as much when irrigation and foliar treatment were combined. The elements mentioned in Table 1 are not present in Intra Eco Shield. This indicates that the unique formula of Intra Eco Shield supports the natural intercommunication of the plant; working as a chain reaction and setting other nutrient pathways in motion.

	Ca (ppm)		K (ppm)		K:Ca		Mn (ppm)	
	Start	End	Start	End	Start	End	Start	End
<b>Foliar</b>	575	998	3353	4412	5.84	4.42	0.5	0.73
<b>Irrigation</b>	570	960	3613	4131	6.34	4.3	0.77	1.34
<b>Irrigation + foliar</b>	557	993	3390	4141	6.08	4.17	0.91	0.74
<b>Control</b>	753	774	3024	4084	4.01	5.28	0.67	0.47

**Table 1.** Highlights of plant sap results Intra Eco Shield at the beginning and the end of the trial.

## Short Summary

So, when lowering the heating temperatures to reduce energy costs, foliar treatment of Intra Eco Shield can support the plant and increase crop development compared to non-treated plants. The foliar application of the unique formula of Intra Eco Shield resulted in higher cucumber production in plants grown under cold conditions (an increase of at least 5%), compared to plants without treatment of Eco Shield. The cucumber plants were even able to improve their nutrient uptake and efficiency, leading to a more balanced uptake and better overall plant health. A healthier plant is able to gain a better tolerance to stress. A weekly foliar application of Intra Eco Shield will support nutrient uptake and lead to strong plants in cold temperatures.

