

The CRUISER[®] Vigor[™] Effect – Field proof and scientific explanation why this Syngenta neonicotinoid is more than an insecticide seed treatment

Michael Schade¹, Ryan Klaveano¹, Eddie Cassidy¹, Christoph Grimm²

¹ Syngenta Crop Protection AG, Professional Products, Basel/Switzerland

² Syngenta Crop Protection Mönchwil AG, Research Biology, Stein/Switzerland

Email: michael.schade@syngenta.com

Abstract

Crops treated with CRUISER[®] (active ingredient: Thiamethoxam) have shown an increased level of plant vigor and health beyond what appears to be a standard plant response to increased protection from an insecticide. This 'vigor effect' has been witnessed in multiple countries and on multiple crops, including Oil Seed Rape and Canola. Thousands of field trials for direct comparisons with other neonicotinoid insecticide seed treatments reveal that CRUISER[®] is the best of its class.

Years of scientific research prove and explain the CRUISER[®] Vigor[™] effect. Key scientific findings from Syngenta researchers and university third-party studies now reveal that the effect can be attributed to the biosynthesis of specific functional plant proteins. These proteins help the plant to better cope with numerous adverse environmental growing factors, such as drought, heat stress, low pH, UV light, high soil salinity, toxic levels of aluminum, and wounding from pests, wind, and hail. As a consequence, plants treated with CRUISER[®] are more tolerant towards tough growing conditions and can reach far more of their genetic yield potential.

Key words: insecticide seed treatment, vigor effect, CRUISER[®], plant health

Introduction

Thiamethoxam is a superior insecticide that will deliver consistent performance on a wide range of sucking, chewing and soil-dwelling pests. In addition, crops worldwide are responding to Thiamethoxam treatments with faster emergence, increased plant stands, enhanced root systems and more vigorous growth, delivering higher yields even in situations where there is no visible insect attack. Thousands of field trials prove these effects are statistically sound.

Thus, growers selecting Thiamethoxam brands such as CRUISER[®] and ACTARA[®] over competitive products can expect not only the outstanding performance on insects, but also an enhanced plant vigor, which more importantly leads to higher crop yields and greater returns.

Material and Methods

Field trials:

- More than 1000 paired yield comparisons vs. other neonicotinoids conducted in the USA, Canada, and Europe from 1996-2006.
- Crop yield comparisons in canola, corn, cereals, soybeans, cotton, dry beans and sunflowers.
- Statistics: Calculation of the median. Wilcoxon Rank Sum test on the medians to determine if differences are significantly different from 0 or random.
- Derived data to % Yield of Standard ((CRUISER[®]/STD)*100)
- Plotted CRUISER[®] response curve vs. Standard („S” curve)
- Laboratory assays:
- Various molecular biology methodologies were applied to identify physiological reactions of the plant after CRUISER[®] application.

Note: At submission date, the experiments were still ongoing. More detailed descriptions and results will be presented at the congress in March 2007.

Results

Field trials:

In a direct comparison, CRUISER[®] treated canola provides higher yields than the two comparative neonicotinoids A and B (Fig. 1a and 2a). In 66 and 80 % of the trials, the CRUISER[®] yield response was more pronounced than the treatment with the neonicotinoids A and B respectively. The difference between CRUISER[®] and the other compounds was even greater, when there was no visible insect attack (Fig. 1b and 2b).

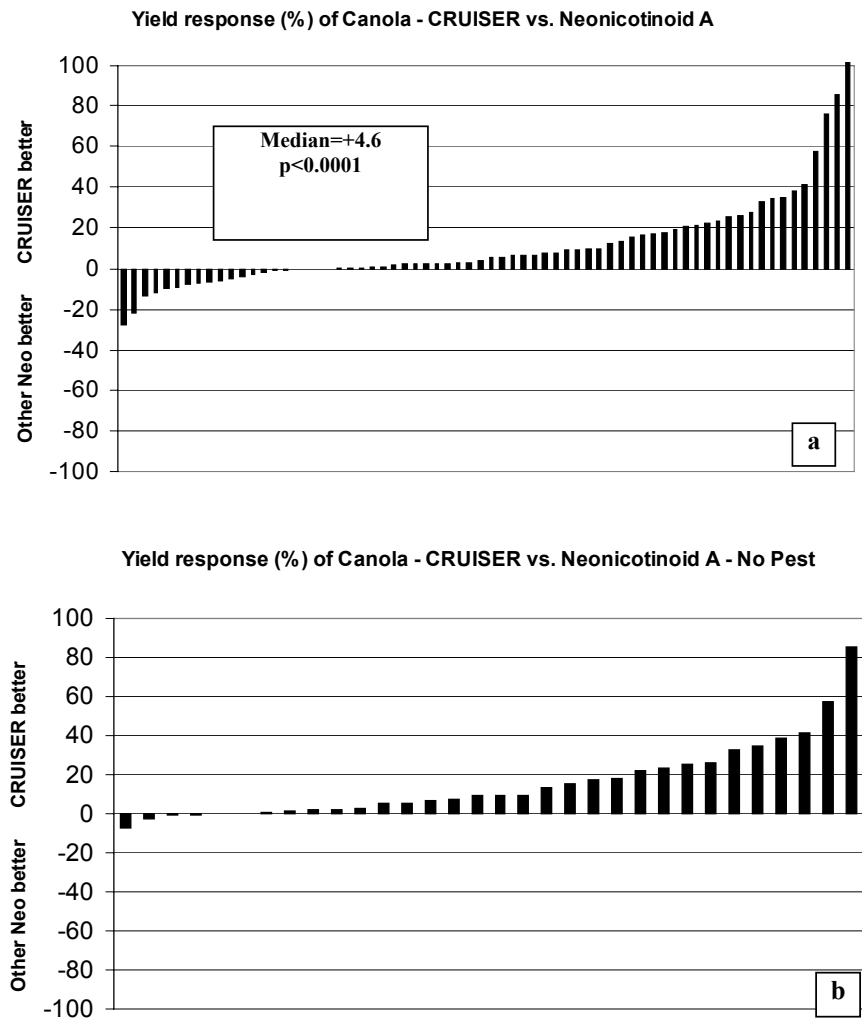


Fig. 1. a) Yield response of Canola treated with CRUISER[®] and neonicotinoid A. P-value: 0.0001 is very highly significant.
b) Trials with no visible pest attack.

Laboratory findings:
As Thiamethoxam is highly water soluble and systemic, it penetrates into the plant roots and shoot, partially moving into the plant cells (Fig. 3). In the plant cells, it triggers various physiological reactions, which are measurable as an expression of functional proteins. Latest findings prove that Thiamethoxam improves the level and activity of specific functional proteins, which interact with various stress defense mechanisms of the plant, allowing it to better cope under tough growing conditions, such as:

- Drought
- Low pH
- High soil salinity
- Free radicals from UV radiation and other sources
- Heat stress leading to protein degradation
- Toxic levels of aluminum
- Wounding from pests, wind, hail, etc.
- Virus attack

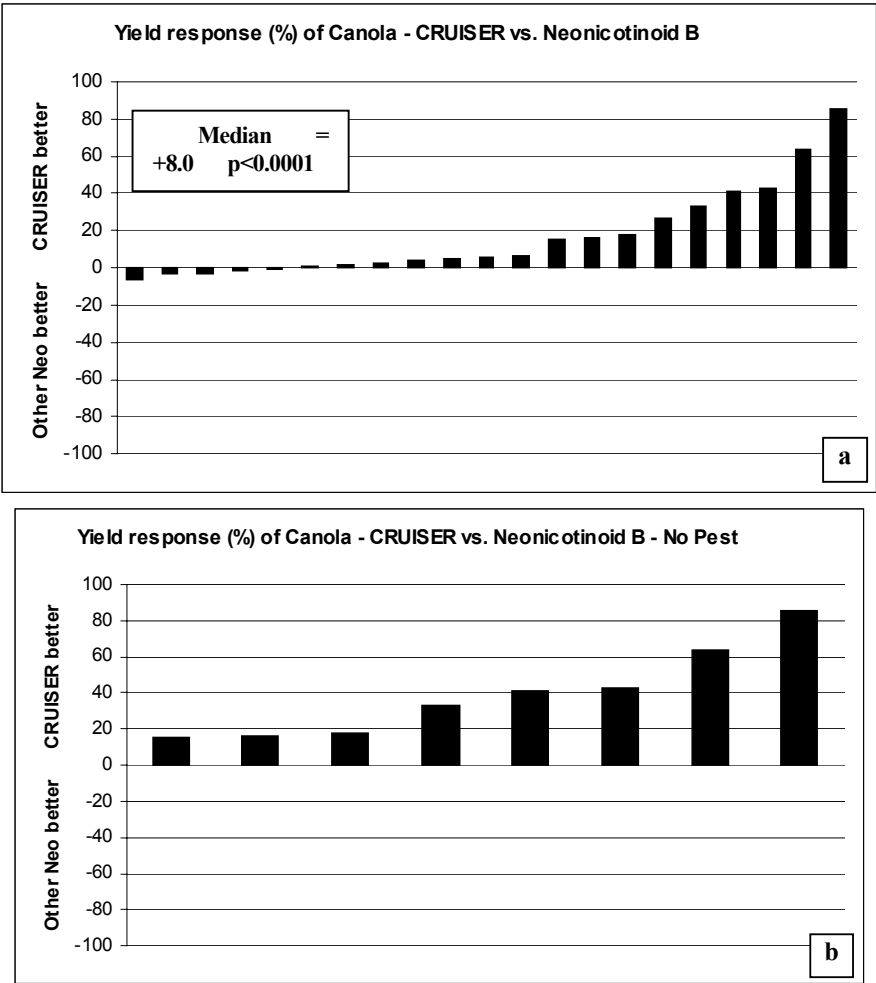


Fig. 2. a) Yield response of Canola treated with CRUISER® and neonicotinoid B. P-value: 0.0001 is very highly significant.
b) Trials with no visible pest attack.

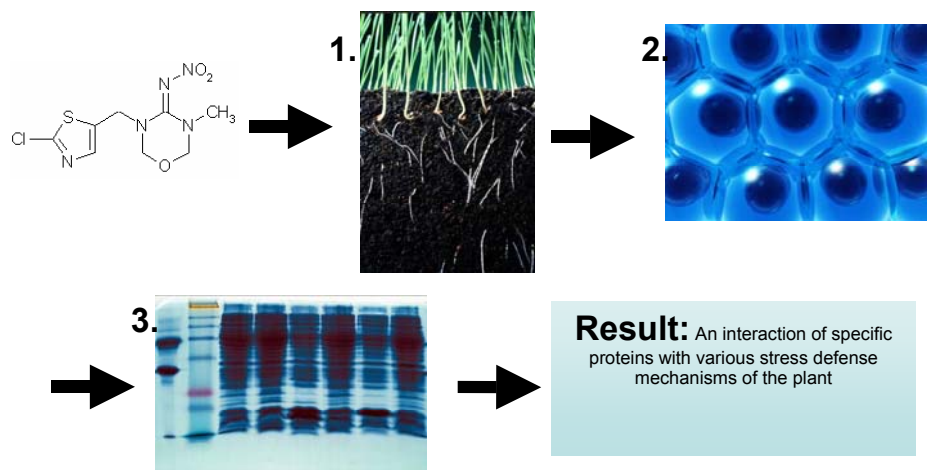


Fig. 3. Flow diagram of the mode of action of the CRUISER® Vigor™ effect. 1. Plant penetration. 2. Systemic movement to plant cells. 3. Physiological reactions lead to expression of functional proteins.

Conclusions

Under field conditions plants are normally exposed to various stress factors which can reduce the plant’s ability to reach its genetic yield potential.

Plants treated with CRUISER® are more tolerant toward these stress factors. Consequently, they can grow more vigorously under suboptimal conditions, giving them a better chance of reaching their full genetic yield potential.