



A NatuGro Case Study

INTRODUCTION

In 2015, Koppert selected a strawberry field in Central Coastal California, among other fields in this region, to test the application of the NatuGro system for the purpose of yield increase in field grown fresh market strawberries. The NatuGro system comprises of a combination of products that is easily integrated in drip applications and follows a fool proof application schedule based on international experience by the Koppert research department. Here we present the findings of a case study where the grower implemented the NatuGro system from planting until the last harvest and was able to increase yield by 10.7% effectively compared to the plot without the NatuGro system.

MATERIAL & METHODS

Products

The NatuGro system consists of 4 products, 3 bio-stimulants (Vidi Parva, Vidi Fortum, Vidi Terrum) and Trianium. The NatuGro products are a combination of plant- and seaweed extracts, amino acids and enzymes (Koppert Biological System 2013). Bio stimulants are made up of a diversity of formulations of microorganisms, enzymes, or natural compounds such as plant or seaweed extracts with the purpose of providing the crop with readily available or easier to retrieve nutrients (Yakhin et al. 2017). While the mode of action of bio stimulants is generally accepted as a modifier of physiological processes in plants, the exact processes and pathways have not been elucidated. In principle, chemical communication occurs between individuals or organs that modulate metabolic pathways and networks within the plant, thus positively affecting these interactions with bio stimulants would lead to improved productivity.

Trianium contains the beneficial fungus *Trichoderma harzianum* T-22, a fungus that lives in close relationship with the root system of plants. *Trichoderma* species produce antibiotics and enzymatic compounds that affect other fungi (pathogens), but also compete directly with other microorganisms for space and or resources (Harman 2004). Since *Trichoderma* are strong root colonizers and with that stimulate root growth, as a consequence plant growth and production increases.

Trial setup

The strawberry variety was Monterey and both the treated plot and the control plot were approximately 9 acres each for which the irrigation systems were separate. The strawberry plants were planted bare root. Aside from the application of the NatuGro system all other crop management treatments (fertilizer, fungicides, pesticides) were kept the same, although adjusted where necessary when not compatible with the NatuGro system. In December 2015, 4 weeks after planting, the first products were applied. Hereafter at set time intervals (specifics are part of a tailored protocol) a combination of products was applied throughout the growing season using the drip irrigation that was already in place. Shipments of the products were set-up beforehand by Koppert to ensure on-time applications.

Measurements

Strawberries were harvested in 1 pound clamshells with 8 (= 8 pounds) per tray. Harvest was calculated as number of trays per acre and in that way comparable between the treated plot and the control plot. The development of harvest was tracked weekly for the duration of 20

weeks from where average yield per week – and cumulative yield was calculated. In addition, the number of flowers were counted every 2 weeks on 15 randomly selected plants per plot. The number of flowers is a proxy for harvest (strawberry load on 1 plant) 3 weeks later.

RESULTS

The average strawberry yield (Figure 1) was higher in the first half and the second half during harvest. The weekly harvests were only slightly different halfway the season and towards the end except for the final pick. The average flower count was higher with NatuGro compared to the Control for each week during the full harvest period (inset).

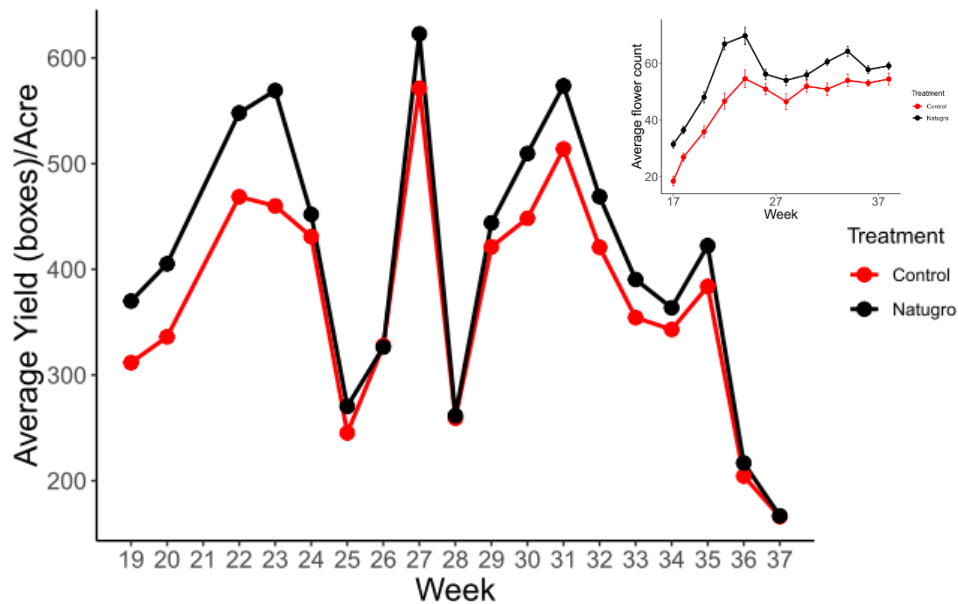


Figure 1. Average weekly strawberry yield (boxes/acre) with and without the NatuGro system.

The cumulative strawberry yield (Figure 2 below) increased faster with NatuGro in the first 6 weeks during harvest. Hereafter the yield stabilized, but after week 28 started to increase again faster with the NatuGro system compared to the Control. The final cumulative yield was 10.7% higher with NatuGro.



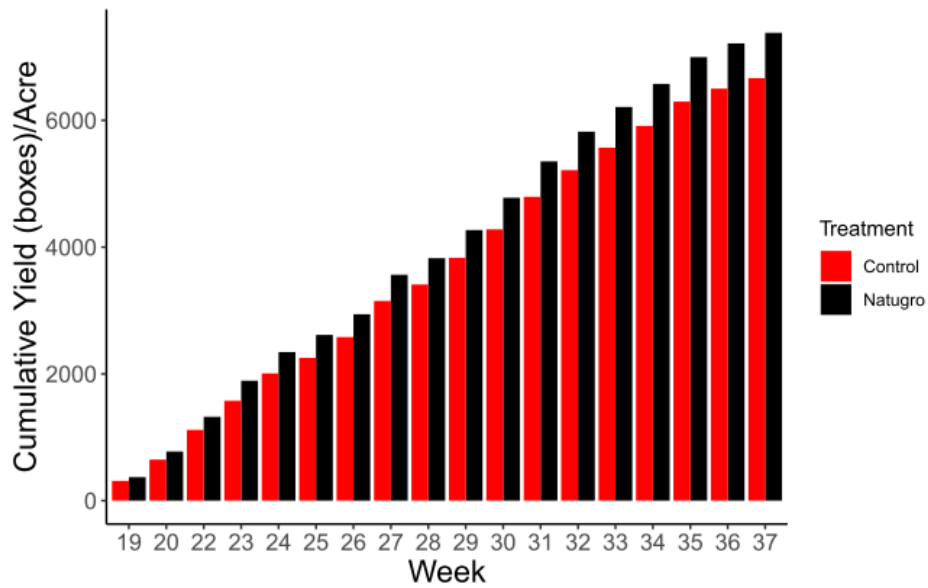


Figure 2. Cumulative weekly strawberry yield (boxes/acre) with and without the NatuGro system.

CONCLUSIONS

- The strawberry variety Monterey showed a cumulative 10.7% yield (boxes/acre) increase
- The largest yield gains were in the first 6 weeks and the last 7 weeks of harvest. In accordance with yield, plants treated with the NatuGro system produced on average more flowers per plant