

SCD Probiotics®

Case Study Summary – Strawberry Yield and Quality Improvement with SCD Bio Ag® (3 trials)

Agriculture – Crop yield and quality (CSS-056-17)

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Industry: High value field crops
Application: Product applied in strawberry production
Products: SCD Bio Ag®

Highlights

- SCD Bio Ag-treated plants yielded more – between 4.0% and 6.0% more yield compared to control
- In one study, SCD Bio Ag-treated berries were 9.8% larger than control, although less favorable results were also found in other studies
- In one study, Brix° measured for SCD Bio Ag-treated berries was 3.3% higher, although less favorable results were also found in other studies
- The fraction of damaged fruit was 15 percent less in plants treated with SCD Bio Ag compared to Control

Introduction

Strawberries have high economic value and considered as one of the most valuable fruit crop. Strawberries are harvested by hand to ensure the highest quality berries and 16.3% of freshly harvested are exported annually. To keep strawberry production strong and competitive, farmers have a constant need to introduce new, more sophisticated farming practices. These include improvements in water or fertilizer efficiency, salinity control, and careful pesticide management, all of which should generally provide superior input to output ratio and support the farms' bottom lines, while maintaining high environmental quality. To support those goals, farm managers are often encouraged to try new or alternative inputs, such as biostimulants consisting of living, beneficial microorganisms.



In this study, SCD Bio Ag, an all-natural, microbial additive product was applied to strawberry farms. SCD Bio Ag contains a blend of more than 10 active, beneficial microorganism species and their metabolites, specifically designed to benefit the plant. This product is proposed as a cost-effective, natural alternative or enhancer to chemical additives. The theory behind SCD Bio Ag technology is that it induces superior microbial activity and diversity in the soil ecosystem, which in turn improves plant growth parameters. In order to investigate SCD Bio Ag's effect to strawberries, three trials were conducted that measured yield and quality (Brix°, weight and size) in SCD Bio Ag-treated and non-treated berries.

Methodology

Trials were performed in commercial field settings. Control and treatment plots were defined by irrigation system setup at individual farms so that SCD Bio Ag was applied on terminal valves supplying water to plantation sections (1.7 to 3.2 per section). Control areas were selected from among adjacent plantation sections fed from different terminal valves. SCD Bio Ag was supplied before planting or as soon as possible after planting via irrigation system. This was followed by applications during vegetation and harvest, performed at 1 to 4-week intervals.

In each section (treatment or control), subplots were established at random locations (5 subplots, 20 plants per plot = 100 plants per section). Berries were harvested manually before commercial harvest, but not all commercial harvest events were covered. Therefore, results reported in this case study summary do not necessarily approximate overall, commercial yield. They instead accurately capture differences between yield in control and treated plots. Each individual harvested berry's weight was read, then the berries were crushed to release their juice. From the juice, Brix° was read with a portable refractometer. A summary of methods is provided in Table I below.

Table I: Methodology Summary for Studies.

Trials	Study I	Study II	Study III
Application	Weekly or biweekly applications during vegetative stage and	<ul style="list-style-type: none">• First application before planting.• Plant dipping.	<ul style="list-style-type: none">• First application before planting• Plant dipping.

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	harvest until 20 gal. per acre amount was achieved.	<ul style="list-style-type: none"> • Applications during vegetative stage and harvest until 40 gal. per acre amount was achieved. 	<ul style="list-style-type: none"> • Applications during vegetative stage and harvest until 40 gal. per acre amount was achieved.
Variety	PS 2059	Fronteras	Fronteras

Figure 1: Study Locations at Three Different Fields.



Field 1



Field 2



Field 3

Results

Yield

SCD BioAg-treated plants gave between 4.0% and 6.0% more yield. The following yield increases (Treatment vs. Control) were reported (Figure 2):

- Study 1: +4.7% in yield
- Study 2: + 4.0% in yield
- Study 3: +6.0% in yield

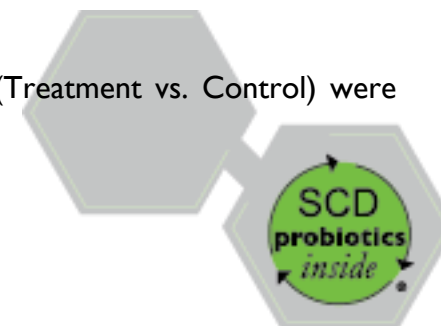
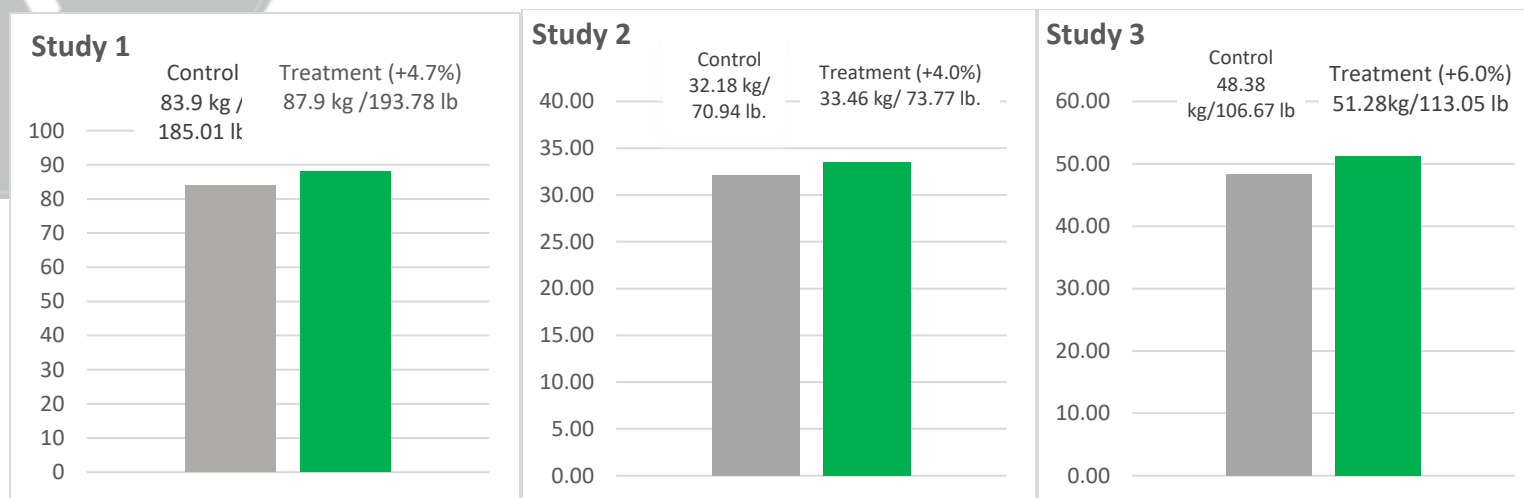


Figure 2: Total Harvested Berry Weight (kg and pounds) in Control and SCD-treated Fields for Study 1, 2, and 3.



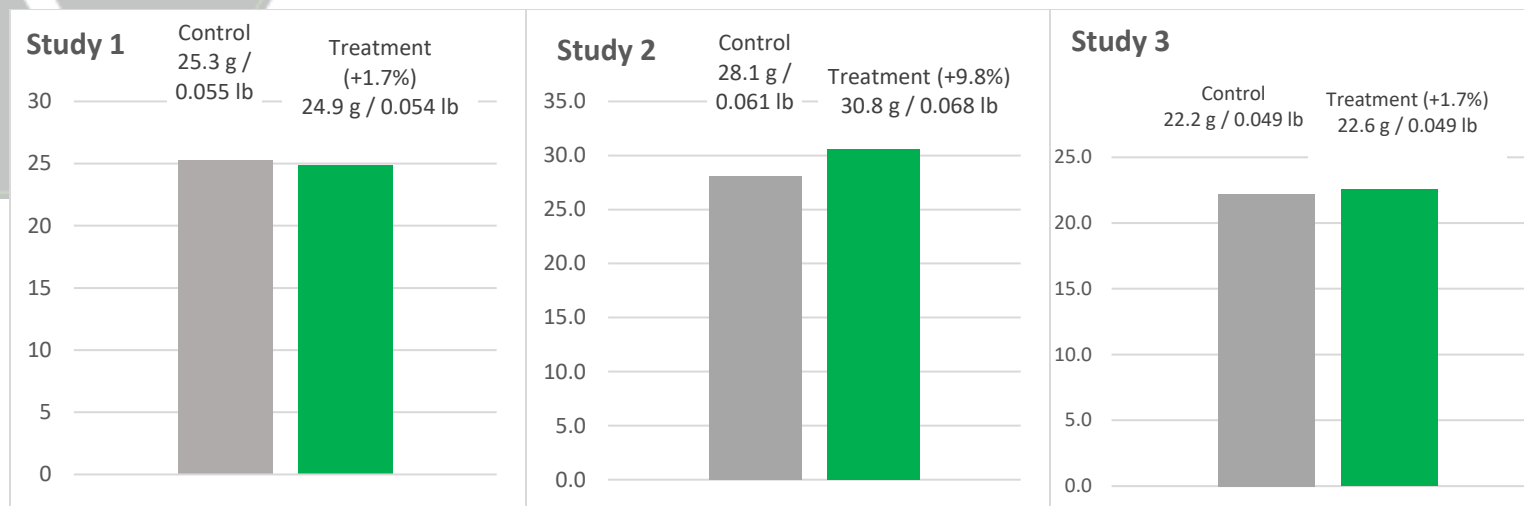
Average Berry Weight

SCD Bio Ag's impact on berry size was variable. In detail, the following results were reported (Treatment vs. Control) (Figure 3):

- Study 1: -1.5% in berry weight
- Study 2: + 9.8% in berry size (see also detailed berry weight class summary on Figure X)
- Study 3: +1.7% in berry weight



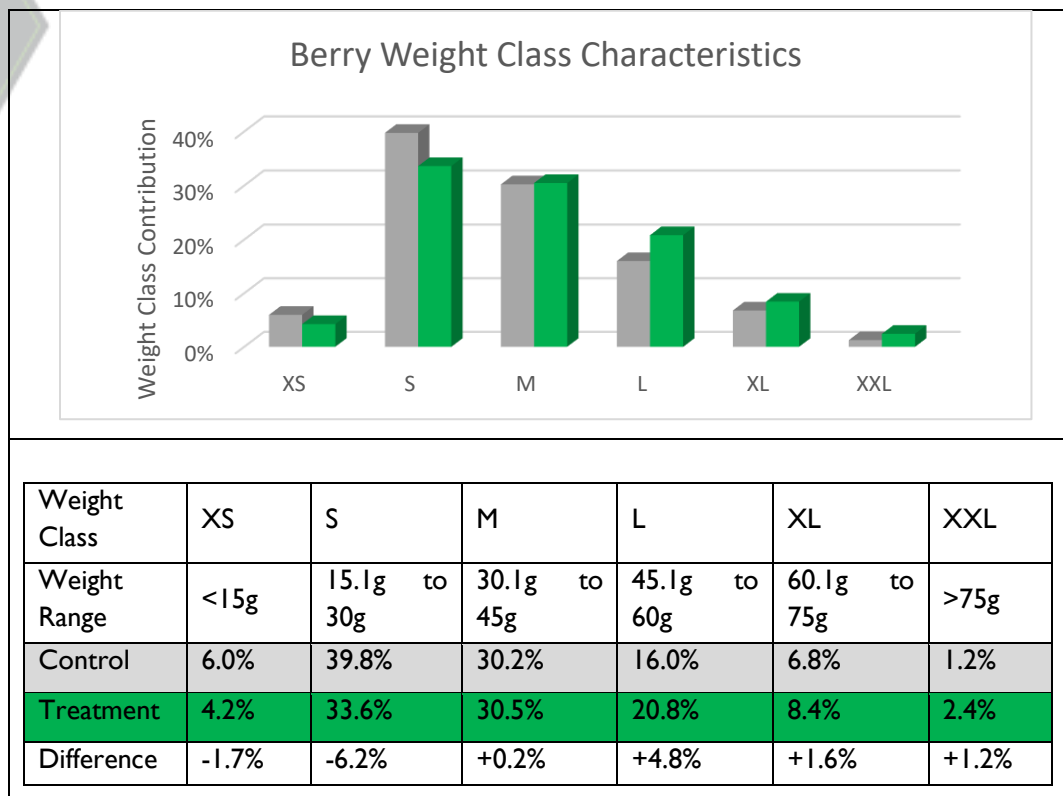
Figure 3: Average Berry Yield (grams and pounds) in Control and SCD-treated Fields for Study 1, 2, and 3.



Also, presented in Figure 4, are several berry weight classes. For each class, % of berries is given from all berries harvested in Study 2.



Figure 4: Detailed Weight Classes Summary for Study 2.



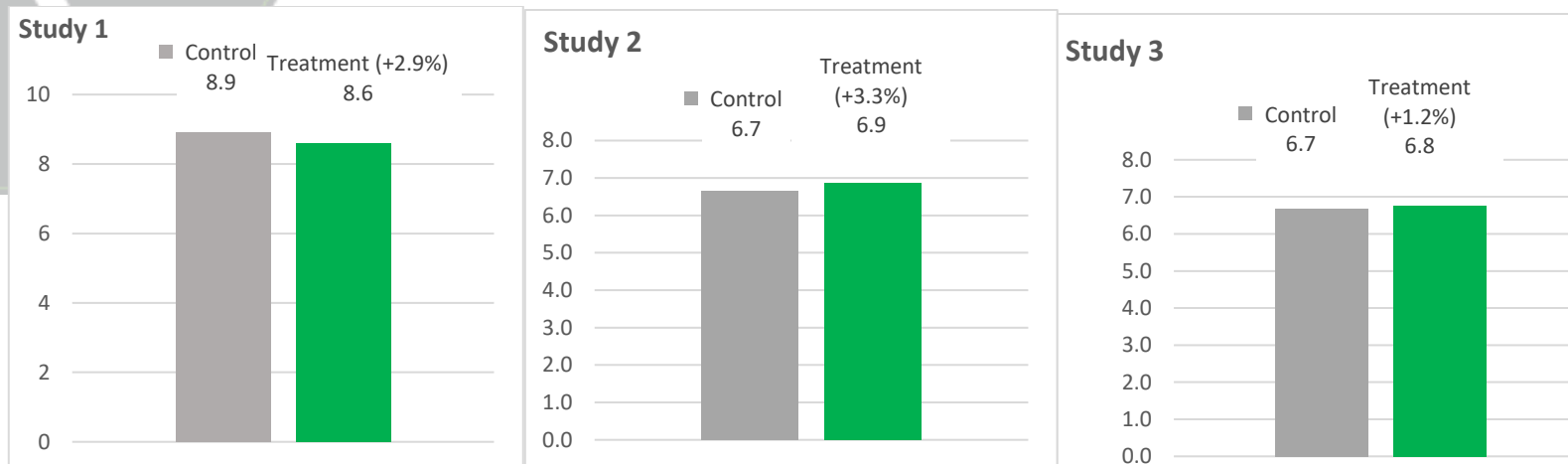
Quality (Brix°)

SCD Bio Ag's impact on berry quality in terms of Brix° was variable. In detail, the following results were reported (Treatment vs. Control) (Figure 5):

- Study 1: - 2.9% in Brix
- Study 2: + 3.3%
- Study 3: +1.2%.



Figure 5: Control and Treatment Groups Brix Values in Studies 1, 2 and 3.



Auxiliary Benefits

Besides yield and overall quality indicators, several other important crop characteristics were measured. For example, in Study I another fruit quality indicator was measured — the number of damaged fruits and variation in berry weight class characteristics (Table II, Figure 6). When stress factors were particularly strong, the fraction of damaged fruit was 15 percent less in plants treated with SCD Bio Ag than in the Control group. A comparison between damaged and healthy fruit is shown in Figure 7.

Table 2: Fraction of Damaged Fruit Between Control and Treatment Groups in Study I.

Fraction of Fruit Damaged due to Pest and/or Weather Conditions		
Date	Control	Treatment
10/19/2016	27%	12% (↓ 15pp)
1/10/2017	52%	37% (↓ 15pp)



Figure 6: Fraction of Damaged Fruit between Control and Treatment Groups.

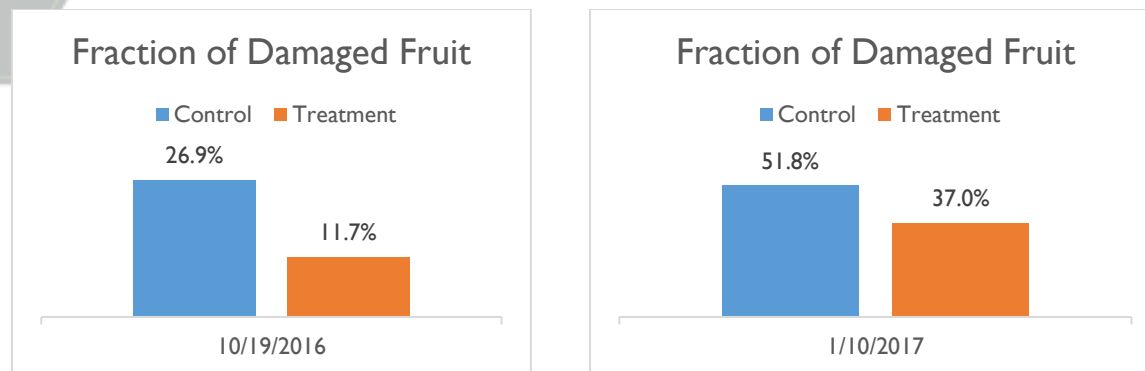


Figure 7: A Comparison Between a Damaged Berry (left) and a Healthy, Marketable Berry (right).



Conclusions

To date, SCD Bio Ag has been shown to drive both yield and quality, while also showing some beneficial impact on berries' resistance to adverse conditions. Results come from studies performed in small plots (1.7 to 3.2 acre), and researchers recommend continuation of trial on a larger scale (approx. 30-50 acres under SCD Bio Ag), which would allow the grower to independently track and appreciate results. SCD Bio Ag's efficacy may be extremely beneficial to farmers who want to increase profitability in strawberry farming. As is the case with many other biostimulants, results may vary between application sites, but these trials provide good baseline information for researchers and strawberry farmers.

