



**CASE STUDY:**  
**Application of the Plant Growth Promoting Product,**  
**ACF-SR AgKit, on Soybeans.**

**Indiana (Noble County), Farm Owner: Ryan Marshall, Tel: (260)-316-1191**

**Introduction:**

Soybeans are Ohio’s largest crop with over 5,000,000 planted acres. Along with optimizing other inputs, use of ACF-SR has been proven successful at improving soybean yield per acre in multiple countries and soil types. ACF-SR is a plant growth promoting bacterial product that works as a biofertilizer (fixes nitrogen, solubilizer phosphorous and potassium, fixes carbon). ACF-SR also provides growth hormones, and various enzymes that are critical to plant health.

In 2022, the average soybean yield in Ohio was 55.5 bushels per acre, and the average farm price was \$14.40 per bushel. This Case Study, from a 2022 project conducted in similar weather conditions to OH (Northeast Indiana) demonstrates that AgKit use provides net benefits to soybean farmers well more than the cost of ACF plus its cost of application.

**Materials and Methods:**

ACF-SR AgKit consists of 5 gallons of liquid ACF-SR and 10 lbs of powdered ACF-SRP. ACF-SR is made from the following non-toxic, non-pathogenic, non-GMO microbes:



Name	ACF-SR (Concentrated Liquid Formula)	ACF-SRP (Highest potency powder)
Bacillus amyloliquefaciens	++	+++
Bacillus licheniformis	++	+++
Bacillus megaterium	-	+++
Bacillus subtilis	++	+++
Rhodopseudomonas palustris	++	-
Nitrosomonas europaea	++	-
Nitrobacter winogradsky	++	-

The AgKit is prepared for use by diluting these items into 275 gallon tote of water and aerating the mixture for 72 hours. After aeration is complete, the product is ready for application to the soybeans. In general, the product is added as soon as possible after aerated prep is completed, but for sure within 14 days. A one minute video showing this simple process is found here: <https://vimeo.com/802204973>

Once the product is prepared, it is typically dosed at as follows:

- **First dose: 2 gallons ACF-SR AgKit per acre at planting (in furrow, broadcast, as appropriate for your farm)**
- **Second dose: 2 gallons ACF-SR AgKit between V2 to V4**
- **Third dose: 4 gallons ACF-SRP AgKit (powder only) per acre at R1**



## Results (Greenhouse and Farm Evaluation)

To obtain the strongest data possible, greenhouse growth and actual farm growth of soybeans were performed simultaneously.

### Greenhouse Protocol:

- One-gallon pots were filled with actual farm soil to about 1/2 inch from top. The soil was not packed down, as this would inhibit germination.
- Water soil thoroughly. After watering, soil should be about 1" below rim to provide
- sufficient headspace for watering.
- Three seeds were planted per pot approximately 1/2 inch deep and covered with soil. Water was gently applied so that soil settled around seeds.
- Pots were placed under light, with equal PAR light at soil level for all variations. Lights were automatically turned on and off, with a total of 12 hours of light per day.
- 7 days after plants germinated, the two smallest plants in each pot were removed
- As growth continued, watering varied as expected. During the first two weeks, watering was performed identically to all pots, twice per week. As growth continued, watering increased based on the dryness of the soil, but all pots were watered identically and received the identical light and PAR each day.

Four variations, each with 6 pots, were set up as follows:

1. **Soil and Water Only:** This program was simple and easy to control. Seeds were planted with no fertilizer and none of our ACF-SR product. Plants were watered with the systematic equal moisture approach as noted above, with equal water to all pots, for all 3 protocol.
2. **Traditional Fertilizer Program:** Beginning at day 7 after planting, the 6 Fertilizer Only pots were dosed with 15-16-17 set at 200 ppm N, three times per week.
3. **ACF-SR Dosing:** ACF-SR was mixed in with water and applied at the rate of 1 ml per square foot of pot area. Additional dosing of ACF-SR was performed in 2-week intervals
4. **1/2 Fertilizer & 1/2 WB-SS:** In this variation, fertilizer was applied at one half the rate (targeting 100 ppm rather than 200 ppm), and ACF-SR

### Greenhouse Results:



The pots treated with the full dose of ACF-SR, and those pots treated with 1/2 ACF-SR plus 1/2 normal fertilizer, dramatically outperformed the fertilizer only and the water only pots.



## Farm Protocol:

In 2022, Ryan Marshall (contact number 260-316-1191, Nobel County, Indiana) used ACF-SR and ACF-SRP on 90 acres of soybeans.

Dosing was performed as follows:

### AgKit Applications:

- First Dose: ACF-SR, at planting, broadcast, 3 gallons per acre
- Second Dose: ACF-SR, at V3 stage, 3 gallons per acre
- Third Dose: ACF-SRP, at R1, 3 gallons per acre

## Farm Results:

Ryan Marshall treated about 90 of his 900 acres of soybeans with ACF-SR, using the timing noted above, during the 2022 season. According to Ryan, the yield and health of his plants were dramatically superior to the prior year. From 2021 to 2022, yield increased from 52 bushels (untreated) to 63 bushels per acre (treated). Ryan also pointed out the superior root structure of his crop, and knows that with the superior root structure, his farm during relative drought conditions will be much better than farms without ACF-SR.

2022 Yield at this Farm on the acres NOT TREATED with ACF:

**55.9 bushels per acre**

2022 Yield at this Farm with use of ACF-SR / ACF-SRP:

**63 bushels per acre**

Yield Improvement Compared to Untreated Acres:

$$(63-55.9)/55.9 \times 100 = \mathbf{12.7\%}$$

Yield Improvement, Year over Year, at same farm:

$$(63-52)/52 = \mathbf{21\%}$$

From the farm owner, Ryan Marshall,

*“My soybean yield improved between 12.7% compared my untreated acres, and 21% compared to last year at my farm. For every dollar spent on ACF and its cost of application, I still have a dollar or more in NET SAVING. There is no doubt that this is a cost-effective input that increases my profits and gives me an excellent crop”.*

*For more information about ACF-SR and ACF-SRP, contact:*

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