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2011 SoySoap Research Report

HEALTHY PLANET.
HEALTHY PEOPLE.

Farmers report that *SoySoap* gives you these benefits:

Drought buffering

In climates and seasons with dry-weather stress, farmers report SoySoap-treated corn and soybeans yield 10 to 20 bu. more than adjoining control fields. Midwest random-replicated field trials in 2009 and 2010, when both seasons had abundant to excessive rainfall, showed typical yield benefits of 2 to 5 bu. of soybeans and 4 to 10 bu. of corn. Unless growers did random-replicated trials, they probably didn't "see" such differences in yield. Larger yield differentials between treated and untreated crops show up primarily in seasons of dry weather stress.

Foliar efficiency

In four years of on-farm tests, SoySoap is proving itself as the "missing link" in foliar fertilization. It is more than a powerful surfactant: It is also what agronomists call an "awesome carrier" to move foliar-applied NPK and trace elements into crop metabolism. This is especially vital in a glyphosate program, to offset glyphosate's chelation of Manganese, Boron and other trace elements.

Lodging resistance

Larger roots are a consistent "signature" of SoySoap applied at V2. A healthier root helps corn resist lodging under late-season fungal attacks and wind.

Higher crop quality

Fruit and vegetables sprayed regularly with SoySoap typically have higher sugars for more consumer taste appeal and storage life.

Help for herbicides

SoySoap's tiny colloids help transport herbicides into leaves — and throughout weeds — for more complete kill of resistant weeds. Farmers also tell us *soybeans and corn rebound faster* after temporary stress of glyphosate application, probably because they replenish chelated trace elements more quickly.

For information, please Email:

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See on-farm videos and field reports at our website:

www.biobased.us

or call **800-995-9203**

Home office: 4237 Cornelius Road, East Bend, NC 27018

Or call your local distributor

SoySoap is our federal trademark for a non-toxic surfactant to improve efficiency and translocation of moisture and nutrients in crops, especially under stress of dry weather. SoySoap is formulated from biobased food additives on the U.S. Food and Drug Administration's EAFUS list of "Everything Added to Food in the United States." BioBased USA of East Bend, North Carolina, markets only through authorized distributors in the U.S. and overseas. Each independent distributor establishes a private label.

Corn

In a dry season, big corn roots built by SoySoap save 10 to 15 bu. more yield. In a year with abundant rain, SoySoap typically adds 4 to 10 bushels.

The charts here summarize plot trials conducted by S&R Consulting of Atlanta, Indiana, headed by professional consulting agronomist Steve Wolf of S&R Consulting based in Atlanta, Indiana.

Wolf conducted random-replicated corn yield tests at 11 locations in Ohio, Indiana and Illinois in 2009, and at 8 locations in Ohio and Indiana in 2010. Each location had three random treated plots plus a control plot.

Corn treated with SoySoap II, introduced in 2010 and now standard product for the Midwest, outyielded control plots by an average of 15.2 bu. per acre in 2009 and 11.2 bu. in 2010. The average yield gain over two years of random-rep trials spraying SoySoap alone at V1 to V2 in Ohio, Indiana and Illinois: **13.2 bushels**.

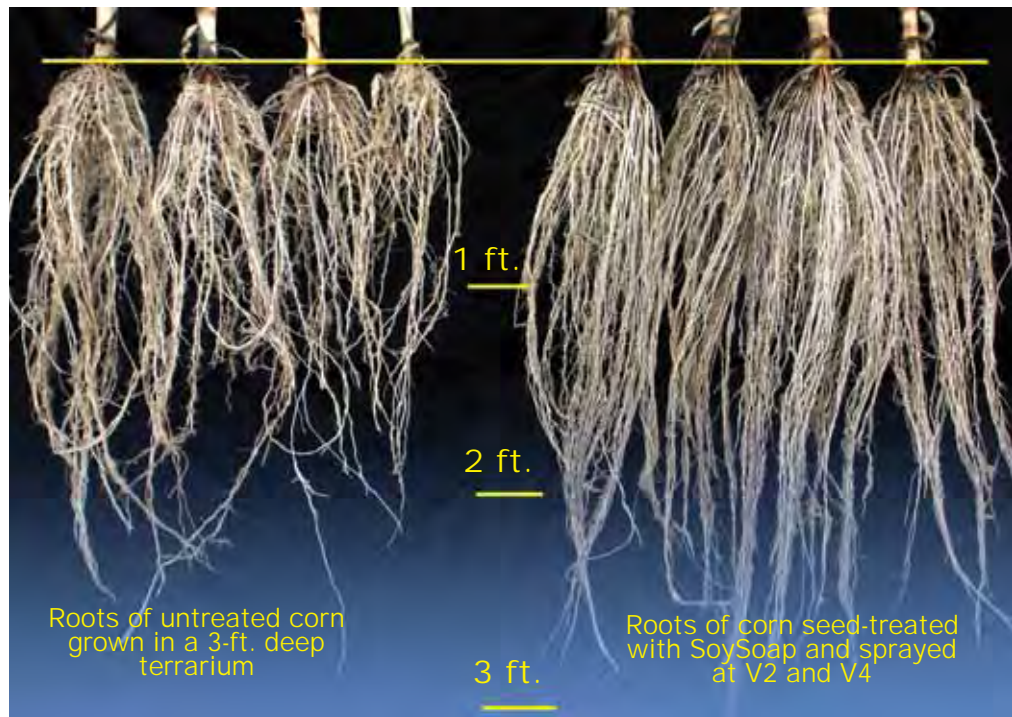
Keep in mind that these are plot trials, not field strip trials. Farmers know that plot yields are usually higher than whole-field or strip-trial yields. In small 40-foot plots, there's more "edge effect" than in a solid-planted field.

Considering these trials together with farmer strip trials using weigh wagon and combine monitor data from across the Corn Belt, we suggest that you peg your corn yield benefit expectations for a range of 4 to 10 bu. of corn in a year with good rain.

This presumes SoySoap is applied alone or with a herbicide at 5 to 8 ounces per acre — and no later than V2 growth stage. *This application timing is critical to encourage early root growth.* We also encourage you to measure yield differences with a weigh wagon or well-calibrated yield monitor to verify performance.

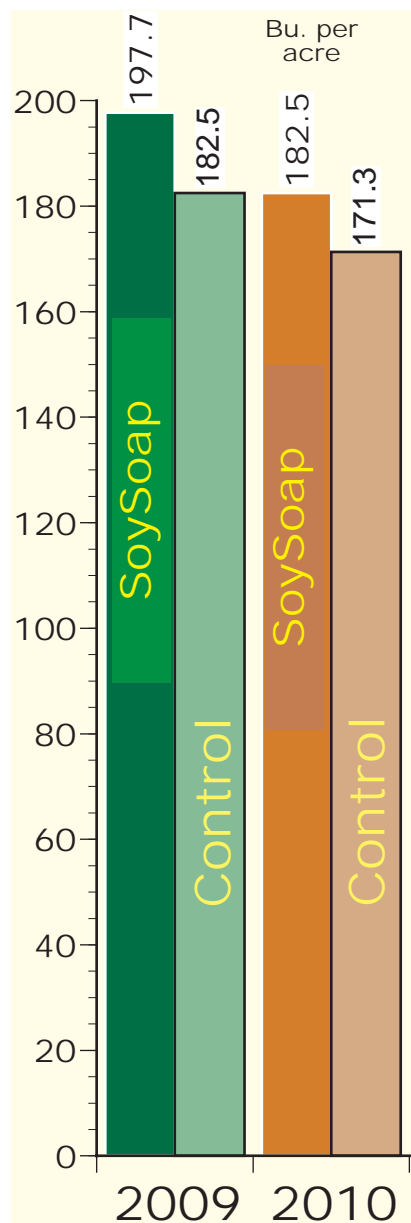
An excellent time to apply SoySoap the first time in the season is when you're applying a postmerge herbicide when corn has its first two leaves.

How SoySoap enhances roots: In the photo below, corn grown in soil-filled boxes a foot wide, three feet deep and six feet long was seed-treated with SoySoap, then sprayed with SoySoap at V2 and again at V4. At maturity, sides of the terrarium were removed and soil was washed from the roots. Treated roots are on the right of the photo, untreated on the left. Total weight of roots from the treated corn was twice that of untreated corn.



Untreated corn (above) was grown in a terrarium with the same soil as the treated corn. These roots are adequate in a season with good soil moisture. The biggest yield differences between untreated and treated crops typically show up after dry-weather stress.

Roots of corn treated with SoySoap (above) are 50% more massive, with roots reaching almost 3 ft. deep. A North Carolina State U. corn plot trial by agronomist Ron Heiniger found a 14-bu. gain with two SoySoap treatments.



2011 will be an important research year. Usually, a yield enhancer needs to show consistent effectiveness over three to four seasons, in varied locations, before it's "officially" considered effective.

However, two seasons of data with SoySoap II — the now-standard formula — is promising enough that we encourage you to run strip trials on your farm in 2011. Farmers who've used it since 2007 say "If it's green, we'll spray it with SoySoap."

Corn

SoySoap helps mobilize foliar-applied nitrogen! In this 2010 strip trial, the nitrogen/SoySoap combination added almost 12 bu. per acre to corn yield.

Our foliar-feeding corn trial in Grundy County, IA in 2010 offers more evidence that extended-release nitrogen “spiked” with SoySoap can improve a good corn yield by almost 12 bu. per acre.

Yields in the chart at right are averages of four 8-row strips, each 2,300 feet long. The two treatments were 1 gal per acre of Kugler’s KQ-XRN 28% nitrogen, with and without SoySoap. The nitrogen is formulated for sustained release over about 30 days.

Foliar-applied nitrogen alone showed a 6.8-bu. yield increase over the untreated control strips.

When SoySoap was tank-mixed with the same rate of nitrogen, strips sprayed with the combination averaged another 5 bu. per acre, hitting 190.2 bushels.

Total yield gain for SoySoap and slow-release nitrogen together: 11.88 bu. per acre. SoySoap cost: \$6.05 for 5 ounces per acre. Nitrogen cost: \$7.45 per acre. Add \$5 for application; total was \$18.50.

Even if corn goes down to \$4.90 per bu., the net benefit for the SoySoap/nitrogen combination is \$40 per acre.

Several fertilizer manufacturers are offering new or improved slow-

release foliar nitrogen products. They want to increase consistency of yield improvement under a wide array of conditions. Our field tests show that SoySoap improves leaf coverage, absorption and nutrient translocation in the crop to help achieve consistency.

SoySoap’s mode of action relies on “nano-sized” micelles: less than a billionth of a meter.

SoySoap micelles reduce the “stickiness” of water in the nutrient solution of leaves and stems. Nutrient solutions flow more easily under osmotic pressure.

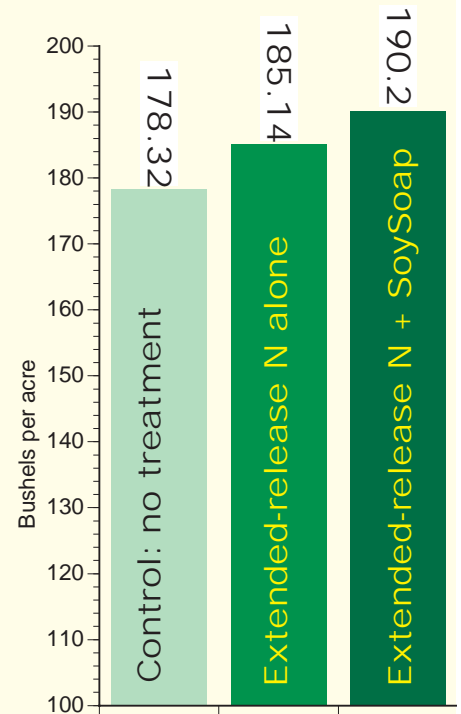
In fact, farmers with computer-controlled spray monitors note that it takes 3 to 5 fewer pounds of tip pressure to apply the same volume of spray material per acre.

We first noticed the “transport” capability of SoySoap when Southern farmers saw how glyphosate spiked with SoySoap killed weeds which had become “resistant” to glyphosate.

We reasoned that if SoySoap improves herbicide absorption and translocation, it should also enhance foliar fertilizer efficiency and yield.

Field trials in 2010 indicate we’re working with a viable idea. Next, we need to refine rates, fertilizer formulas and application timing for the most cost-effective results.

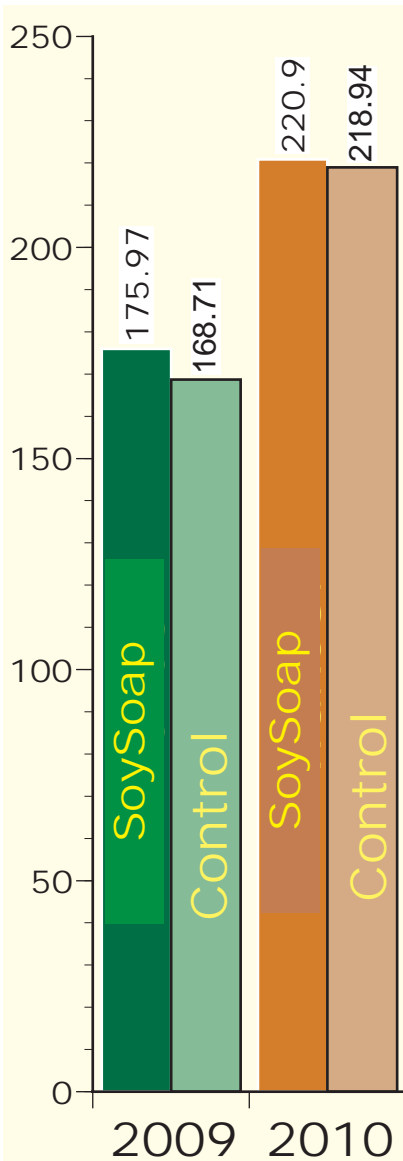
Corn, 2010
Grundy County IA



\$40 per acre more profit from extended-release nitrogen plus SoySoap



Here’s how the field looked at application time... and at harvest. Corn from control strips averaged 58 lbs. per bushel. Corn treated with nitrogen alone averaged 57.4 lbs. per bushel. Corn treated with Soysoap and nitrogen averaged 59.2 lbs. per bushel.



One central Iowa farmer averaged 4.61 bu. per acre gain over two years by applying SoySoap at the two-leaf stage (chart above). Excess moisture in 2010 probably reduced the benefit of a larger root structure. We report this two-year experience to encourage you to keep expectations realistic, and to do strip trials so you have a firm record of what actually happened.

Another Iowa farmer tank-mixed SoySoap with Stoller Company's BioForge. A 4.3-acre untreated control plot yielded 144.69 bu. per acre. An 8.4-acre sample from the rest of the field, where he had applied SoySoap tank-mixed with BioForge, yielded 157.18 bu. per acre. Yield benefit: almost 12.5 bu. per acre with the tank-mixed products. We suspect SoySoap "helped" BioForge do a somewhat better job in the corn.

We encourage you: Try this on your farm in 2011!



You can get a close-up of root growth in a "terrarium" like this, which we built in late spring 2009. Two soil-filled growth chambers each about a foot wide, three feet deep and six feet long, have glass sides. During the growing season, the glass is insulated with solid foam board and protected from the sun with reflective roofing. Air circulates behind the roofing to keep the soil at a nearly constant temperature. At season's end, you remove the glass and wash away some of the soil to examine root growth under varying treatments. In our

experiment, corn was seed-treated with SoySoap, then planted in a standardized soil mix and sprayed twice with SoySoap at V2 and V4. No extra water was applied except at planting, then again in mid-September. SoySoap-treated corn had more massive roots with more root hairs, as shown in the photos above. But the difference was most clear when we washed away all the soil and hung up the roots for comparison (photo on opposite page). If dry weather hits, this is when deep, massive roots hold up your yield.

Raise the brix, get a little frost protection
The green, wet strip in the oats plot at right was photographed the morning of Sept. 27, 2010, after a 29-degree overnight low left frost on our test plot of cover-crop oats interplanted with soybeans. The oats were planted following sweetcorn.

Every leaf not sprayed with SoySoap the previous afternoon was coated with frost. The 1:128 solution of SoySoap and water, applied with a 6-foot spray boom, also contained dextrose at the rate of 1 lb. per acre.

In spring 2010, one of our Iowa clients sprayed SoySoap on soybeans a day ahead of a predicted severe frost. Some beans had the first two true leaves. Two days after the frost, the grower called to say the field "looked really damaged." The beans recovered and grew to become what the grower called "My best beanfield." A nudge upward in brix level helped beat frost.



Soybeans

Random-replicated trials with SoySoap in the Eastern Corn Belt show an average soybean yield increase of 4.74 bu. per acre.

The charts at right represent two years of random-rep yield trials in three states. On average over the two years, SoySoap applied near V2, the second trifoliate leaf stage, meant 4.7 bu. of yield benefit.

You also get “stress insurance” and other benefits which farmers report to us, such as less lodging, healthier beans and heavier test weight.

North Carolina: In 2010, Dr. Jim Dunphy of North Carolina State University ran replicated yield trials on several “yield enhancing” products which have shown some promise in the region.

As you see in the chart below, SoySoap rose to the top two ranks in the trials. There’s not an immense spread in yields across all trials, but this indicates how difficult it is to find “something” which gives you a low-cost way to nudge yields two to four bushels, consistently.

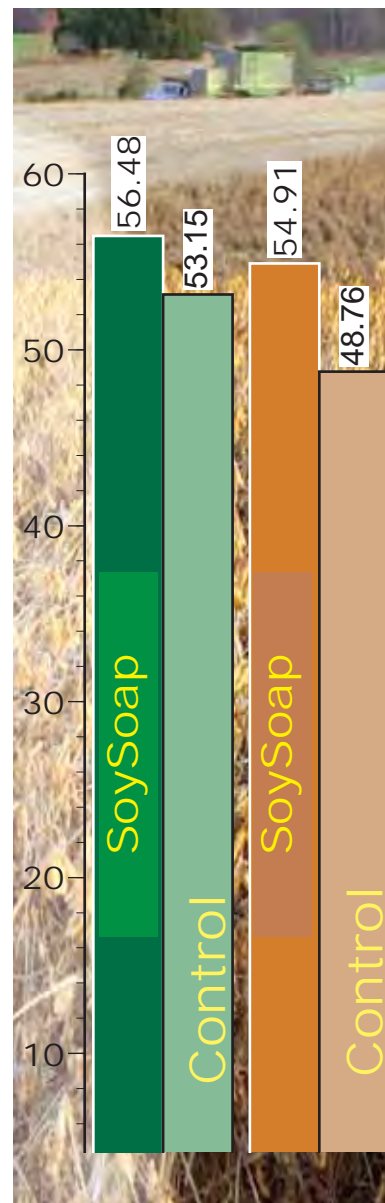
In 2011 we plan to use some of these yield enhancers tank-mixed with SoySoap to test for synergistic effects. Estimates vary on how much of a foliar-applied nutrient is actually absorbed by a plant



A three-week warm, dry stretch in late August and early September stressed the untreated soybeans at left. They're in a soil-filled box 12 in. wide, 3 ft. deep and 5 ft. long. On the same day (Sept. 13, 2009) when both of these photos were taken, SoySoap-treated beans had not wilted. Both had identical soil fertility and moisture. Treated beans had deeper roots, like the corn roots grown in this same terrarium and shown on page 3.

leaf: Some plant physiologists say 20% and others up to 50%. As we observe leaves sprayed with foliar fertilizer, it appears that more of the spray material is absorbed when mixed with SoySoap than when it's sprayed alone.

Even in humid, cool conditions, leaves sprayed with foliar fertilizer and SoySoap are dry to the touch in 15 to 20 minutes.



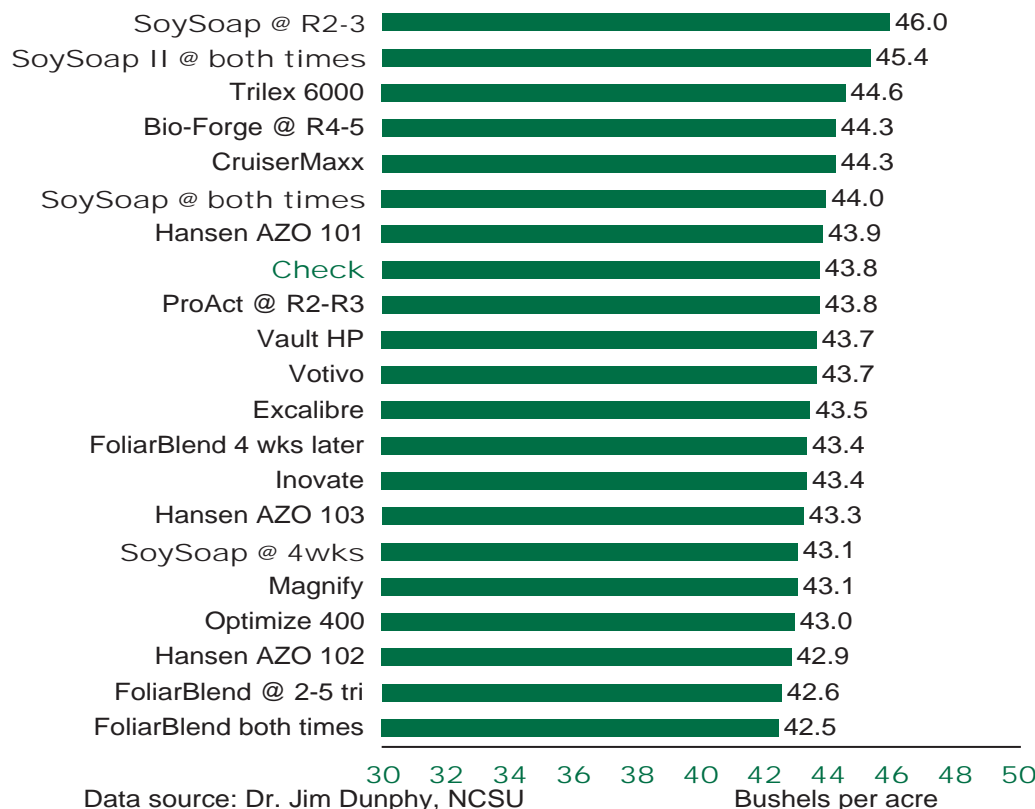
Research agronomist Steve Wolf of S&R Consulting, Atlanta, IN conducted 11 plot trials of SoySoap on soybeans at six locations in Ohio, Indiana and Illinois in 2009, then repeated the trials in 2010 at 8 locations.

Each location had three random-rep plots plus one control plot. SoySoap-treated soybeans outyielded control plots by an average of 3.3 bu. per acre in 2009 and 6.15 bu. in 2010. The average gain on 19 locations over the two years: 4.7 bu. per acre. This is in the midrange of our expectations for soybean response to SoySoap alone, applied at V2 on good fertility and with normal to high rainfall.

In 2011, we encourage growers who are using glyphosate to tissue-test soybeans early for trace elements, especially manganese and boron. If any element is low, foliar-apply a trace element blend tank-mixed with 5 ounces of SoySoap per acre.

Potential Yield Enhancements

North Carolina State University Field Research, 2010





Both photos taken

on July 17, 2008.

We had to show this pair of dry-season fields again, because 2011 just might be dry

Both were planted by Freddie Doub in Yadkin County, NC June 5, 2008 with the same variety, on adjoining fields with the same soil types. Both were sprayed with glyphosate on June 26. Both had the same dry weather: three summer months with only 0.75 in. of rain. The field on the left had SoySoap tank-mixed with glyphosate when it was sprayed June 26 at V2 stage. The field at right was sprayed June 26 with glyphosate alone at V2 stage. With healthier and more efficient nutrient transport, the treated beans had deeper roots, larger leaves, higher leaf sugars, and 4 lbs. per bu. higher test weight. They matured two weeks before the control field at right above. In spite of the dry season and deer damage, the SoySoap-treated field yielded 49 bu. per acre — 17 bu. more than the adjacent field which wasn't treated early with SoySoap. This was one of our early confirmations that deeper roots from SoySoap help keep crops growing longer through dry periods. Across the Midwest in 2009, which was a cool, moist season, average yield gains in replicated field trials with SoySoap were far less dramatic, but still profitable.



Our original Iowa soybean research data is from 32 random-replicated field trials at a dozen locations across Iowa. Strip trials were side-by-side pairs across a field, using a protocol established by Practical Farmers of Iowa, a research and education association. Our data summary was analyzed by Dr. Shonda Kuiper, Professor of Mathematics at Grinnell College. Dr. Kuiper's analysis shows that the paired-trial yield differences were statistically significant above the 99% level. Yield gains for SoySoap were modest but consistent in Iowa's cool, wet season.

Dale Lenz (above) of Crawford County, Southwest Iowa, ran several very precise GPS-based strip trials. He followed up in 2010, and his

data showed that our new formula, SoySoap II, outperformed the original formula used in 2009 and earlier. (And... we're already working on SoySoap III — which we'll test in 2011.)

In Black Hawk and Grundy Counties, we used a weigh wagon operated by Pioneer seed dealer Tyler Schmidt (photo above).

In 2010, our field research trials focused on how to "amplify" the benefits of foliar nutrients by tank-mixing them with SoySoap. Those results are on the next two pages.

If you're interested in helping conduct carefully measured strip trials in 2011, please call us and we'll direct you to your closest regional SoySoap distributor.

Trace element analysis of soybean pods indicates SoySoap helps mobilize foliar-applied micronutrients.

If you raise glyphosate-tolerant soybeans, you may be thinking about foliar-feeding manganese, boron, zinc and other elements in 2011 to help avoid nutrient stresses which make beans more vulnerable to diseases — like SDS.

Crop consultants report that corn and soybeans often have low trace elements. They're concerned that glyphosate ties up, or chelates, these critical elements.

Dr. Dan Skow, International Ag Labs of Fairmont, MN, says that foliar feeding is a cost-effective way to overcome micronutrient deficiencies. He has seen manganese levels in soybeans as low as 10 parts per million, when 50 to 100 ppm is a much safer range.

One way to “encourage” crop leaves to absorb and translocate micronutrients is to chelate or bind them with humic acids, which are complex plant-source compounds readily accepted by crop metabolism. Dr. Dan Skow and a colleague, Dave Larson, pioneered that concept years ago.

A second enhancement to get micros absorbed and metabolized is to tank-mix them with our surfactant/transporter, SoySoap.

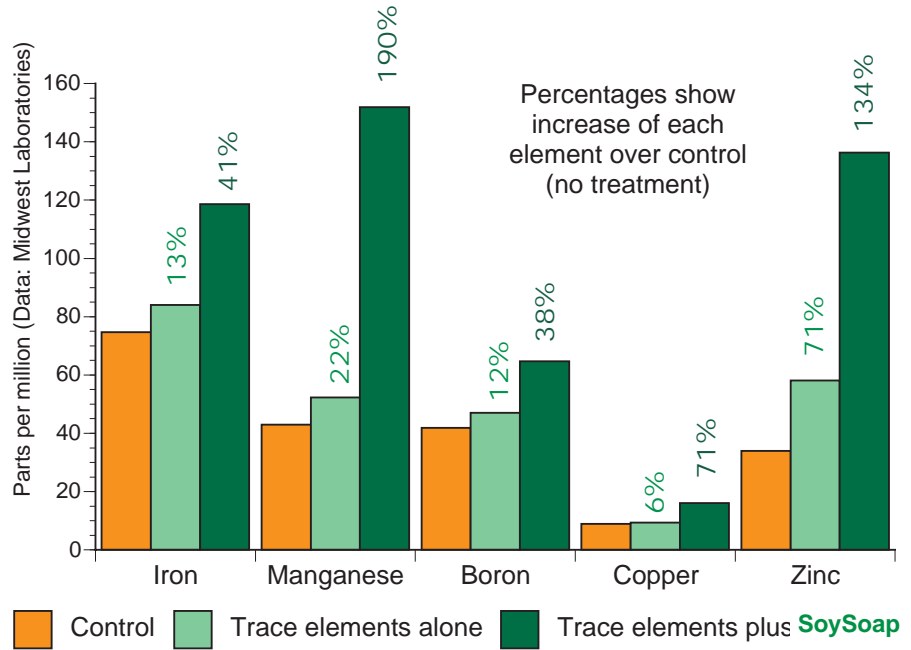
The nano-sized micelles in SoySoap link with micronutrients and make them more soluble in plant solutions. In 2010, a surfactant specialist, Jerry Pritchard of Coila, MS told us, “SoySoap is the “missing link” needed to make foliar nutrients more effective.”

Our 2010 field trials generated evidence of SoySoap's ability as a carrier: Each trace element analysis shown in this chart is the average of seven randomized plots. The test was conducted on beans with glyphosate-tolerant genetics.

Seven plots were backpack-sprayed Aug. 3, 2010 with trace elements alone (analysis in box at right). We used a labeled rate of two pints per acre.

Seven other sites in the same test field were sprayed with the same

Trace element content of soybean pods and beans with foliar-applied trace element blend, with and without SoySoap surfactant/transporter



Test in August 2010 in cooperation with ACRES research farm, Cedar Falls, IA

amount of trace elements, but tank-mixed with Soysoap at 1 part SoySoap to 256 parts of water. The beans were at R6, developing new pods.

Seven unsprayed controls were randomly distributed through the experimental field. Plot design was supervised by Dr. Bertel Schou, owner of ACRES, a research farm.

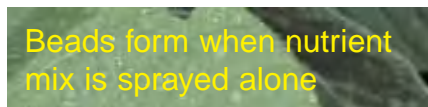
After two weeks to allow for nutrient translocation into soybean pods, 30 or more pods were pulled from each of the 21 plots and analyzed by Midwest Laboratories of Omaha, NE. Very little of the spray had reached the pods, which were

under a full leaf canopy. We were measuring translocation, not drift. The trace mix alone showed a 13% gain in pod level of iron, a 22% gain in manganese, a 12% gain in boron and a 71% gain in zinc.

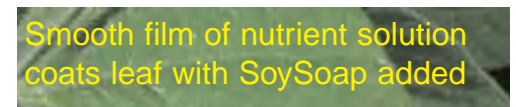
Tank-mixed with SoySoap, the absorption and translocation of traces showed substantially higher levels of all trace elements in pods, compared to the trace mix sprayed alone.

The greatest gain in pod analysis was a 190% increase in manganese, to 151 parts per million. Zinc analysis rose 134%, to 136 parts per million.

We also see a rise in effectiveness of fertilizers and herbicides when they're tank-mixed with SoySoap.



Beads form when nutrient mix is sprayed alone



Smooth film of nutrient solution coats leaf with SoySoap added

Analysis of trace element product used in test (% by weight)	
Boron (B)	0.30%
Copper (Cu)	0.25%
Cobalt (Co)	0.0005%
Iron (Fe)	1.00%
Manganese (Mn)	3.00%
Molybdenum (Mo)	0.0005%
Zinc (Zn)	3.00%

Trace product used was Defender G by FHR Farms/BRT Ag & Turf, Rochester, MN

Here's how a 9.5-bu. soybean yield difference showed up when an Iowa farmer left an untreated control strip.

One of our Iowa clients and research cooperators, Jon Peters of Calhoun County, sent us yield maps and data from 2010 which again point to the effectiveness of tank-mixing SoySoap with effective foliar treatments on soybeans, corn and other crops.

It's one of the few times we've been able to look at a GPS yield map of an entire field and see a definite streak with a consistent yield differential across most of the field. Usually, soil types create such variability that it takes a computer query of yield totals to extract differences between treated and untreated strips.

Except for the untreated test strip which shows up as red, the entire soybean field in the map at right was foliar-fed with SoySoap tank-mixed with Stoller Company's X-TRA POWER. This product contains manganese, magnesium, copper, zinc and amino acids.

From what we saw with four "translocation" trials using SoySoap with trace elements and calcium in 2010, it's logical to assume that SoySoap helped the tank-mixed nutrients absorb into the leaf more quickly, and translocate more readily for full metabolism.

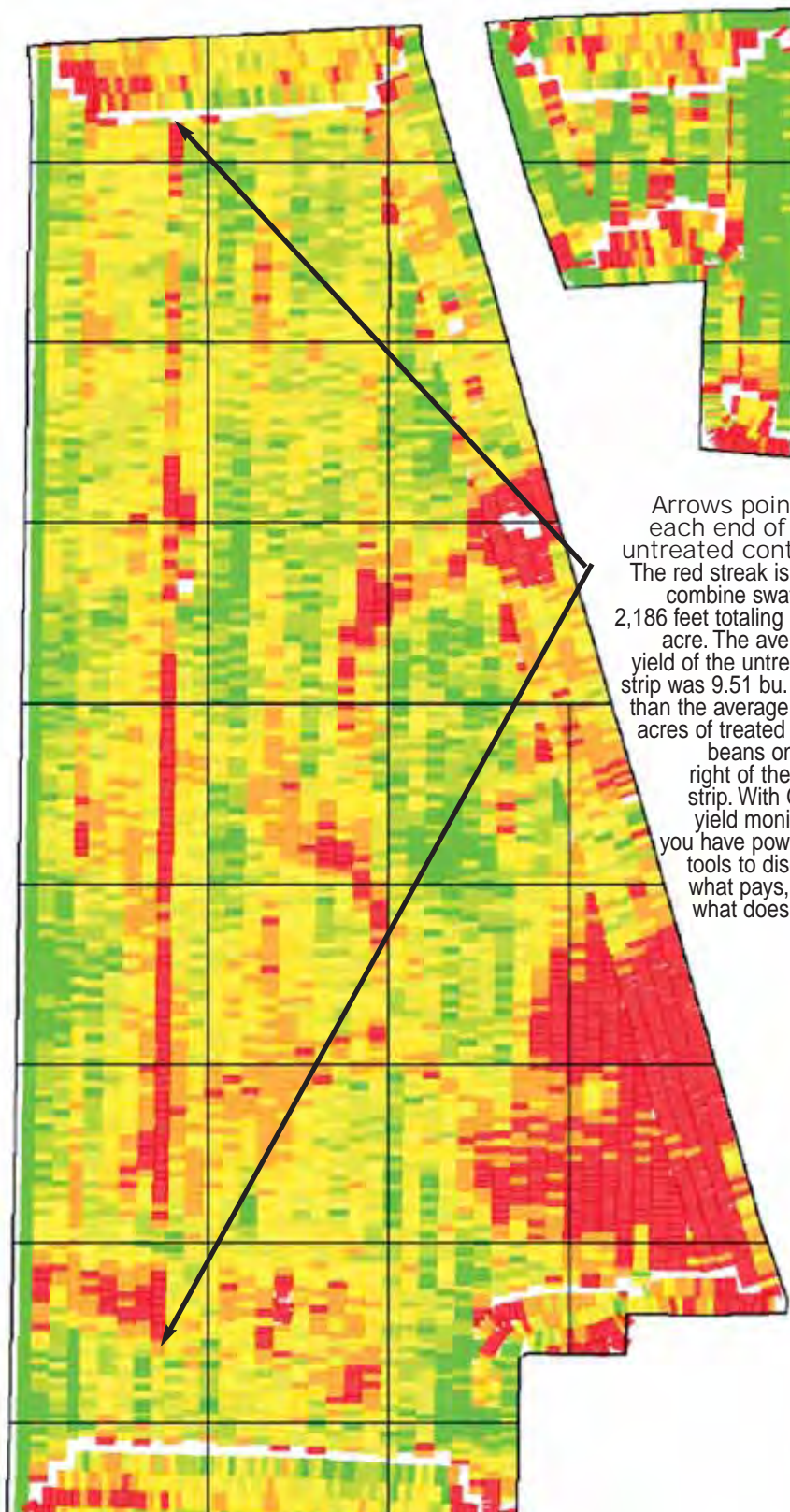
We welcome carefully documented on-farm trials of all kinds, when we can get them! In 2011, Jon will conduct multiple strip trials with various yield enhancers, with and without SoySoap.

In this trial, the untreated strip yielded 55.56 bu. per acre. Three combine swaths on the right averaged 65.07 bu., which was 9.51 bu. higher than the untreated strip. The highest-yielding block recorded by the yield monitor in the treated area was 83.77 bu. per acre, almost exactly 10 bu. higher than the top-yielding block in the control.

With evidence like this accumulating, we understand why fertilizer firms tell us they're interested in blending SoySoap with their foliar nutrients — to make the "best better," as our 4-H clubs taught us.

We've even found that SoySoap is effective in improving nanotech calcium in crops such as oats. And when calcium rises in plant cell walls, other nutrients like phosphorus apparently are extracted from the soil and metabolized more readily in growing tissue.

Would you like to find ways to nudge soybean yields 5 or even 10 bu. per acre? Plan now to conduct strip trials with at least four replications in 2011. We'll show you a protocol that's simple and provides statistically sound data. Just ask!



Arrows point to each end of the untreated control. The red streak is one combine swath of 2,186 feet totaling 1.16 acre. The average yield of the untreated strip was 9.51 bu. less than the average of 3 acres of treated soybeans on the right of the test strip. With GPS yield monitors, you have powerful tools to discern what pays, and what does not.

Wheat *Wheat responds with deeper rooting, higher protein improved yield, lodging resistance and improved health.*

R. W. Bell of Henry County, TN (photo below) sprayed wheat with SoySoap in spring 2010 — tank-mixed with foliar-applied nitrogen. On 1,100 acres of wheat, he averaged just over 80 bu. per acre.

"It's excellent quality grain. Good heads, fat kernels, even though we had a really hot, dry June. The straw stood well and it was easy to combine. Best of all, test weights were almost all close to 60 pounds. I had just one load that tested 57 pounds."

The yield monitor in Bell's big Lexion combine sometimes registered over 110-bu. wheat on his best soils. He began using SoySoap in 2009 and says, "I can really tell a difference in crop performance since I began using it." He applies it on Beans, too. In early August 2010 when temps hit 105 degrees in his region, he said, "People ask me why our soybeans aren't wilting — like all the other beans on neighboring farms."



UNTREATED
WHEAT

SPRAYED WITH
SOYSOAP

Wheat strip trials harvested Aug. 3, 2010 in Cascade County, MT found that winter wheat sprayed with SoySoap tank-mixed with nitrogen at tillering (a little too late for best results) showed 0.5% higher protein and 0.5% lower moisture than untreated wheat.

This is 76-bu. wheat which had good rainfall. It's more evidence that SoySoap helps achieve high yield and high protein.

Heavy rainfall persisting in the Northern Plains prevented reliable weigh-wagon evaluation of most of our wheat trials in 2010. However, one trend was clear when comparing SoySoap-treated wheat with controls: Protein content generally ran 0.5 to 1.5 points higher where SoySoap was applied. Most Northwestern growers using SoySoap in 2011 plan to tank-mix it with sustained-release nitrogen; many will also add trace elements in the blend.

Twice the root mass. Wheat on the right was sprayed with SoySoap at the 2-3 leaf stage. Wheat on the left had no treatment. Each bundle has three tillered wheat plants. This spring, many Plains growers are seeing wheat that needs nutritional support to deal with early drought stress.

SoySoap, tank-mixed with a normal spring foliar fertilizer application, has shown effectiveness in translocating nutrients to wheat roots, encouraging more growth and tillering.

Wheat growers in the Southeast and Texas report that in seasons with dry stress, larger roots with more vigorous colonization of beneficial organisms can result in up to 10 bu. more yield "rescued" from drought. In exceptional cases, yield preservation is even higher.

SoySoap works as a highly effective surfactant on crop leaves, and it's also a transporter of nutrients inside the plant. It reduces surface tension of the sugar and nutrient solution created by photosynthesis in the leaf. That speeds up translocation of nutrients to roots and seed.

SoySoap's initial effect lasts about three weeks. To encourage spring root growth, SoySoap must be applied at the two to three leaf stage. You can also "amplify" the benefit of later foliar fertility sprays by including SoySoap in the tank mix.

Foliar-feed wheat with higher efficiency

The chart at right shows how SoySoap sharply increases absorption and translocation of foliar-fed trace elements in wheat.

Each bar shows the average of four random-rep trials in each treatment: Control with no treatment, the trace pack applied alone, and the trace pack tank-mixed with SoySoap. Note that copper — frequently deficient in wheat — rose by 47% when applied with SoySoap.

SoySoap also helps basic foliar-applied NPK nutrients penetrate and translocate, so you get more efficiency per dollar of fertilizer purchased and applied. Part of the new efficiency is coverage, but much of it is faster internal transport with less osmotic pressure.

This wheat grower has sprayed SoySoap on winter wheat since 2008

Tim Disher, northeastern North Carolina, says that in 2008, the first season he applied SoySoap on half his wheat, “Yield on treated acres was two-thirds higher than the untreated fields. Some treated acres hit 110-bu. wheat. Our straw bale tonnage doubled.”

In 2009, excess rains held down yields; 120 acres of Disher’s 750 acres of wheat flooded out. But he escaped scab infection, and much of his wheat tested 65 lbs. per bushel. His wheat buyer early bought all the wheat Disher raised, to blend up other locally harvested wheat.

In 2010, Disher had a similar positive response on winter wheat, with good test weights.

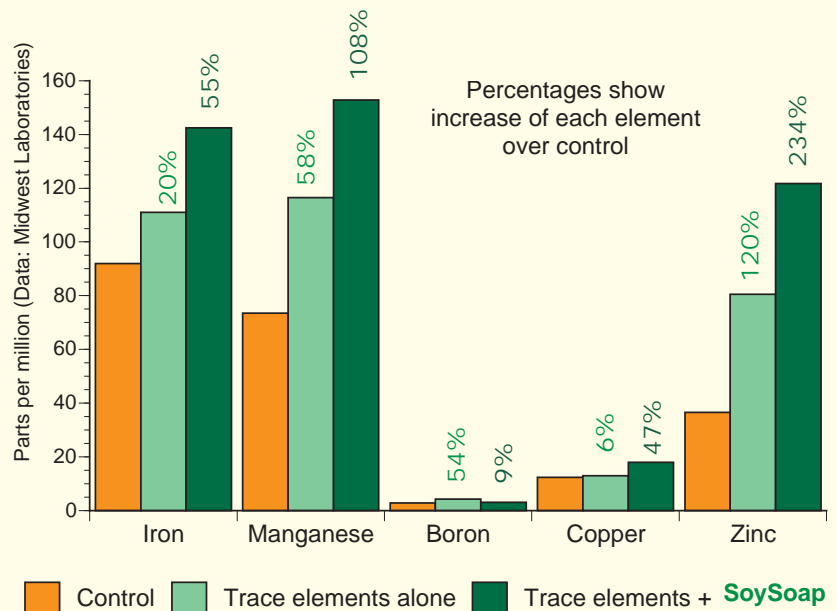
He applies SoySoap three times:

1. SoySoap alone just before wheat breaks dormancy, to infuse the soil so SoySoap is taken up by new roots.

2. SoySoap tank-mixed with 28% nitrogen soon after wheat begins growth. He likes to see some “burn” on leaf tips with the nitrogen. This triggers tillering.

3. A third spray of SoySoap alone at boot stage. Disher says this may or may not add yield, but he considers it “insurance” against stress.

Trace element content of new winter wheat growth 11 days after foliar-applied trace element blend, with and without SoySoap surfactant/transporter



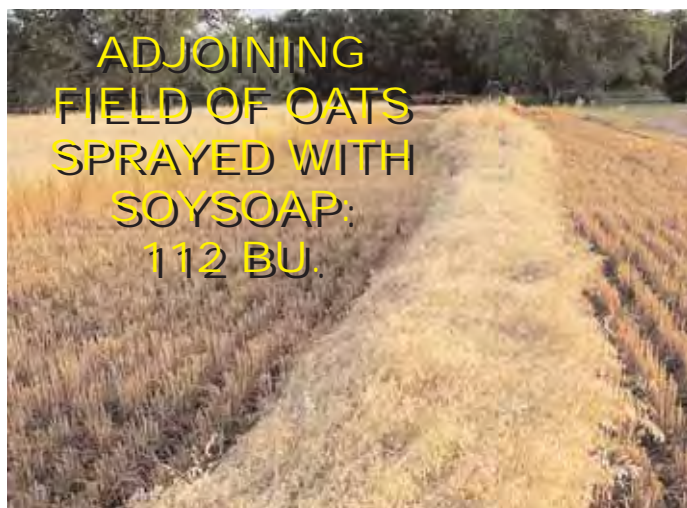
Foliar fertilizer sprayed on winter wheat without SoySoap (above) forms drops, most of which run off. Agronomists advise us that less than 20% of nutrients applied this way penetrate the leaf.

The same foliar fertilizer tank-mixed with SoySoap (below) flows into a smooth film on the leaf, absorbing rapidly into the crop’s circulation and metabolism. Typically, leaves sprayed with SoySoap and nutrients look dry after 15 minutes, indicating that most has been absorbed.



With SoySoap treatment, oats hang onto yield potential through dry weather — and hay shows higher nutrient density.

Oats, Hay



A dry-season example with oats and SoySoap
Here's another example of how bigger roots from V2 spraying with SoySoap can preserve substantially more yield under weather stress. The producer near Hamilton, TX left the oats in the top picture unsprayed. The second field was sprayed at the two-leaf stage.

Dry weather hit this part of Texas in 2010, but deep roots in the sprayed field kept the oats healthier and growing actively. Yield on treated oats was 112 bushels.

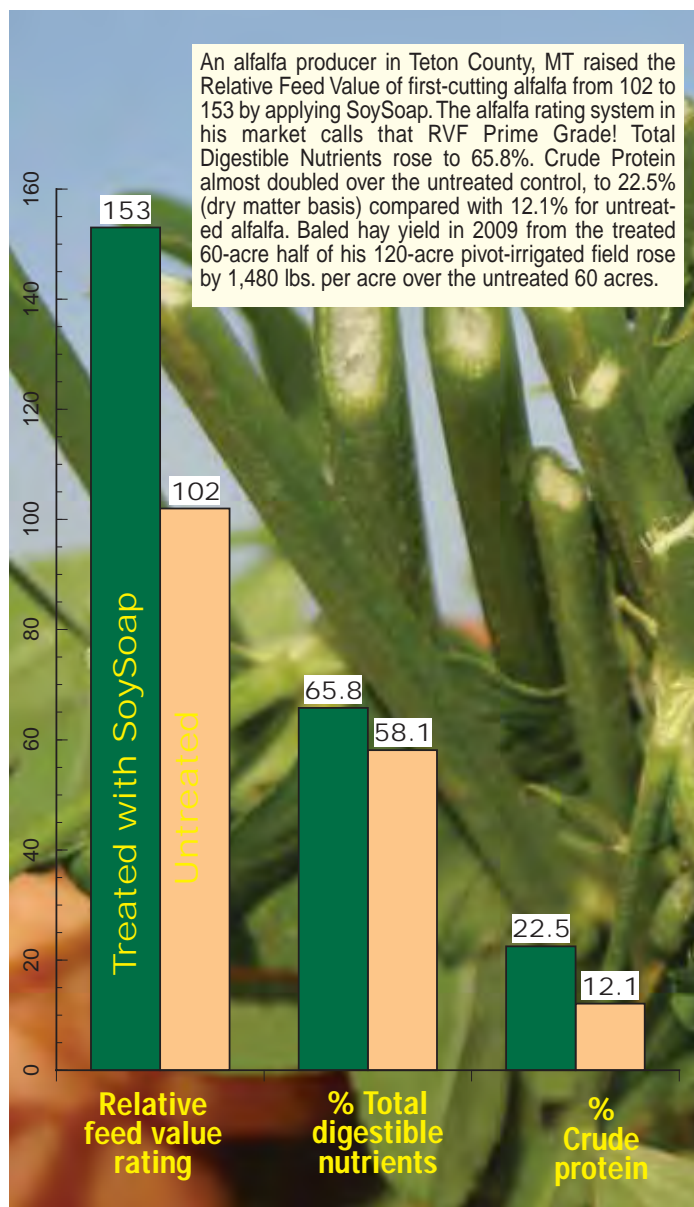


The untreated field stalled out as the soil dried. Rust also hit the untreated crop. You can see rust on stems of the untreated oats (photo, left) as well as cracks in the soil as oats began forming heads. The SoySoap-treated crop had little rust damage and hit 112 bu. per acre.

When you feed your own hay and pasture treated with SoySoap, you benefit three ways: Higher forage yield, higher quality feed, and improved herd health.

The bigger roots also “compound” in perennial crops, adding organic matter to your soil. Crop consultant Jon Linker of North Carolina says, “You may not notice a lot of lush growth in pasture after spraying SoySoap. But dig those roots, and you’ll see a difference between treated and untreated grass. And if your weather turns dry, you’ll see a substantial difference in growth which can extend your haying and grazing season.”

In 2011, we plan to use SoySoap in combination with various trace elements to further enhance relative feed value of alfalfa and pasture mixes. See the chart below to see one result with SoySoap alone.



Various hay markets use differing standards to compute relative feed value, but all depend on high-quality fiber and highly digestible nutrients. When you mobilize nutrient transport with SoySoap, the result is *higher nutrient density*.

Cotton

Big roots, better nutrient transport with SoySoap gives this Georgia grower 224 lbs./acre more cotton.



In 2010, eastern North Carolina cotton grower Allen Warren sprayed SoySoap and averaged just over 1,300 lbs. of cotton per acre from this field in spite of a hot, dry season. In 2009 (his first year using SoySoap) he harvested 1,260 lbs. on a field which had never topped 900 pounds.

Cotton gin receipts show that a Thomas County, GA grower picked 224 lbs. more lint per acre in cotton treated with SoySoap, compared to untreated cotton used as a control field.

Return above cost of SoySoap: about \$250 per acre. The untreated 28-acre control field averaged 558 lbs. per acre. The treated 32-acre field with the same soils, variety and management ginned 782 lbs. of lint.

Another treated 93 acres averaged 772 pounds, further confirming the benefits of SoySoap.

Here's what SoySoap can do for your cotton:

Stimulates deeper, larger roots. Spraying early, when 80% of cotton plants show their first true leaf, SoySoap stimulates larger roots to carry cotton through dry weeks.

Carries nutrients into cotton circulation systems. Growers know that adequate boron in cotton stalks and bolls is critical to hold and mature early, big "money bolls" between the fourth and eighth node.

Tank-mixing SoySoap with foliar-sprayed trace elements helps them absorb and translocate boron and the other traces more effectively, as we have shown in four trials using tissue tests. One experienced crop consultant says, "As a carrier, SoySoap is awesome."

Other growers reported improved cotton yields with SoySoap across the South in 2010.

In eastern North Carolina, a grower averaged 1,121 lbs. on 90 acres despite a dry summer and rainy fall. He says SoySoap-treated cotton matured evenly, with top bolls reaching full potential.

Another of his fields averaged 1,035 pounds. Neighbors who didn't spray SoySoap averaged about 700 pounds.

In 2010, eastern North Carolina cotton grower Allen Warren sprayed SoySoap and averaged just over 1,300 lbs. of cotton per acre from the field above, in spite of a hot, dry season.

In 2009 (his first year using SoySoap) he harvested 1,260 lbs. on a field which had never topped 900 pounds.

Tobacco

You can net much higher profit per acre with SoySoap, just as these top managers are doing!

Todd Harton, Trigg County, KY (photo, right) sprayed SoySoap on tobacco in 2009 and 2010. “We’ve seen yields improve 250 to 300 lb. per acre with SoySoap,” Harton says. That translates to about \$700 per acre. Up to five applications of SoySoap cost around \$30 for the product. Harton produces almost a million pounds of dark fired each year. “Everything we marketed in 2009 and 2010 graded No. 1,” Harton adds. His farm has excellent harvest and firing facilities and a well-managed production program. He says that “SoySoap plays an important part behind the consistent high quality of our dark fired tobacco.” Because of the healthier crop, Harton says that both early and late cut tobacco cures well with one less firing.



Allen Warren, Pitt County, NC

(photo, right) has seen yield and quality gains with SoySoap in previous years. He says: “Our 2010 drought restrained yield gains. But in spite of our excessively hot, dry season, just over 80% of my burley graded No. 2.” Warren adds: “Some of the feedback I get from flue cured growers is that holdability in the field is one of the big benefits of SoySoap. They say treated tobacco stays healthier, and it can typically stand in the field through fall harvest delays. SoySoap promotes easier nutrient translocation, and a strong root system.”



Farmer experiences with frost on tobacco and other crops indicates that SoySoap offers a degree or two of protection against freeze damage. Some of that defense may be an elevation of brix levels (primarily sugars) in the leaves.



John Smith, Henry County, TN (photo, left) sprayed SoySoap on 130 acres of dark fired tobacco in 2010, leaving untreated plots for yield comparisons. His dark fired crop averaged 4,200 lbs. per acre. Before he began using the full program of five SoySoap treatments, his dark fired rolling average was 3,500 pounds per acre. That 700-lb. per acre benefit means another \$1,750 in saleable tobacco — and his entire crop graded No. 1. Smith says “Another thing I like about SoySoap on tobacco: We see a lot healthier plant. This fall the crop kept its quality and weight really well late in the season, nine weeks after topping.”

In hot, dry eastern North Carolina last summer, SoySoap helped farmers keep their tobacco crop growing during the heat from mid-June through July. A primary benefit of SoySoap is *deep, massive rooting* which taps precious moisture and sustains crops through dry spells. One tobacco grower, fearful of losing yields, even hauled water to his SoySoap-treated field with a sprayer nurse tank. The big hose washed out a hole about six inches deep between tobacco rows. In that hole, the grower saw a thick network of tobacco roots extending from both rows. The tobacco was shoulder-high. When late-July rains arrived, his tobacco sponged up moisture and accelerated growth toward maturity and a high-grading crop.

Resistant weeds

SoySoap's powerful translocation action helps speed herbicides into weed circulation systems.

Soybeans sprayed with glyphosate plus SoySoap: No resistant weed escapes

Soybeans sprayed with glyphosate alone: Many resistant pigweeds will go to seed

Soybeans on both sides of this lane had the same weed pressure: Palmer Amaranth was a problem. Both sides were sprayed with a labeled rate of glyphosate when soybeans were about V3. But before spraying the field on the left, the spray operator added SoySoap to the tank mix. In the field on the right, resistant Palmer Amaranth (pigweed) grew above the canopy and made seed after surviving glyphosate alone. When the farmer told us about this side-by-side comparison, we photographed what happened here.

Farmers who mixed SoySoap surfactant with glyphosate in 2007 through 2010 tell us this blend did a visibly better job of controlling glyphosate-resistant weeds. And in regions where weed resistance isn't a problem, growers tell us they're able to reduce rates and spraying trips. That often pays the cost of SoySoap while giving crops a healthy boost.

1 Helps herbicide and foliar fertilizer penetrate leaves in water solution. When tank-mixed with herbicides, SoySoap "chelates" or bonds with the chemicals, increasing absorption into plant leaves.

2 Spreads water and spray materials smoothly in close contact with leaves for rapid absorption. Plant scientists tell us SoySoap softens the leaf's waxy cuticle, allowing spray solutions to directly enter the leaf palisade cells. By sharply reducing water's surface tension, SoySoap colloids move water and nutrients immediately into xylem and phloem tubules.

3 Speeds translocation of natural plant nutrients between leaves and roots, just as it helps overcome sluggish internal movement of glyphosate in resistant weeds. The plant solution is "wetter." When SoySoap is sprayed on beans at the V2 stage, the beans quickly translocate sugars and other nutrients to roots. The roots respond with vigorous growth. Farmers report this helps overcome temporary growth "drag" from glyphosate.



SoySoap colloids, about the size of water atoms, disperse surface dew and penetrate directly into the leaf, carrying tank-mixed chemicals into plant circulation system. This dew-covered soybean leaf was photographed just before spraying, then again a few seconds after spraying. A few minutes later, the water and SoySoap had been absorbed and the leaf was dry. This is an easy demonstration you can do with a spray bottle and a 1:256 mix of SoySoap and water.

Reports from farmers on beating resistant weeds

We don't claim SoySoap is a 100% answer for controlling resistant weeds. It will take a diverse approach including cultivation, rotations and varied herbicides. But until farmers can develop those strategies, they tell us that 5 to 8 oz. per acre of SoySoap in a spray solution "amplifies" effectiveness of herbicides. Here are some typical farmer observations gathered over several seasons:

Leo Perfect of Unadilla, GA: "After I applied glyphosate with and without SoySoap, I could go right to the row and see where almost all kinds of Pigweed had dropped, compared with where I didn't put SoySoap in the spray mix.

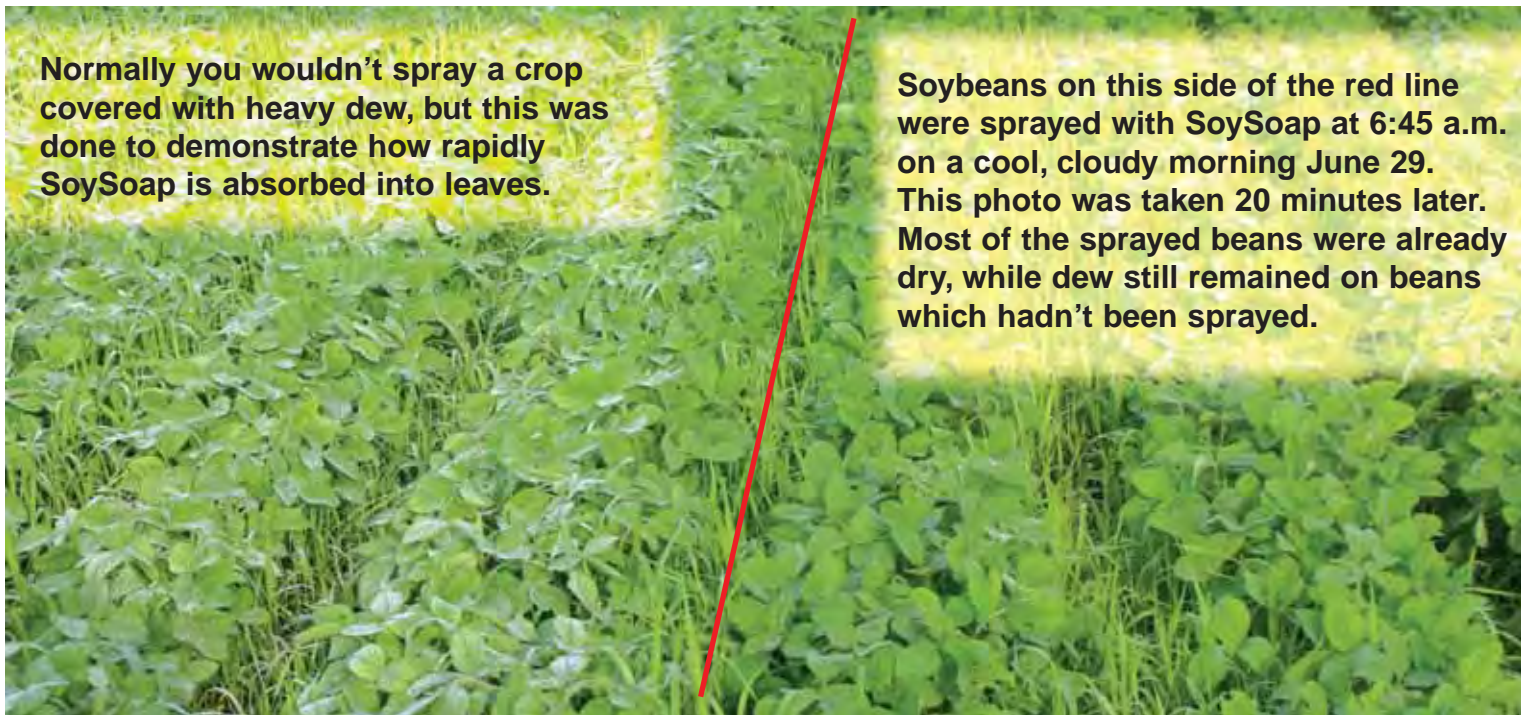
"And in the past I've usually had to spray twice to kill volunteer peanuts in soybeans. The SoySoap-glyphosate mix killed all volunteer peanuts fast — on the first trip."

Chuck Warner of Lebanon, KS applied 16 oz. of generic glyphosate and 8 oz. of SoySoap per acre as a preplant burn-down when weeds were about 5 in. high. He said: "We saw a 48-hour browning of grasses and Shattercane. My custom applicator could hardly believe how fast it worked."

Tim Disher of Lewisville, NC reported: "When we spiked glyphosate with 8 oz. of SoySoap per acre and sprayed early spring weeds in cool weather, we saw a quick kill, like we do on small weeds in warm summer weather. I've found that 17 oz. of glyphosate plus 8 oz. of SoySoap controls Sicklepod and glyphosate-resistant Lambsquarters."

Jared Lane farms near Meigs, GA. He says: "Normally I spray soybeans with Roundup three times. This year, I added 8 oz. per acre of SoySoap with Roundup for the first application, and didn't have to spray again. My soybeans were so green and vigorous they looked almost black. We have all kinds of Pigweed here, including the resistant ones. We have tropical spiderwort — the label rate for that is five quarts. I burned it with 22 oz. of Roundup plus SoySoap."

A Kansas ag consultant: "As a carrier of herbicides or fertilizer, SoySoap is awesome."



Normally you wouldn't spray a crop covered with heavy dew, but this was done to demonstrate how rapidly SoySoap is absorbed into leaves.

Soybeans on this side of the red line were sprayed with SoySoap at 6:45 a.m. on a cool, cloudy morning June 29. This photo was taken 20 minutes later. Most of the sprayed beans were already dry, while dew still remained on beans which hadn't been sprayed.

SoySoap is formulated with reactions which generate a large amount of heat and produce colloids smaller than a billionth of a meter — a "nanometer." Most SoySoap colloids or micelles are about the size of a water molecule. They attach to the positive hydrogen atoms in H₂O, dramatically reducing the surface tension of water. Thus, dewdrops quickly spread across leaves, which quickly absorb SoySoap, water and any herbicides or nutrients in the spray mix. Inside the plant circulation system, sugars and other nutrients in solution translocate quickly from leaves to roots. Since roots exude nutrients from photosynthesis, beneficial soil organisms respond with rapid multiplication, making more soil nutrients available to crops.

SoySoap speeds translocation of nutrients and moisture through crops

Field tests by consulting agronomists demonstrate that SoySoap increases natural translocation of water and plant solutions through plant cells and circulation systems.

When SoySoap is applied early in a plant's growth, such as the two-leaf stage of corn or soybeans, enhanced translocation to the roots through phloem tubes *generates more exudates from roots*. Soil organisms respond to this energy flow by converting more soil nutrients to plant-available form. The resulting larger root system helps keep crops growing through dry periods.

In 2010 field research, we often found 8% to 10% higher average concentrations of sugar in fruit, vegetables and immature seeds, such as corn kernels in milk stage. The "brix" readings in treated soybean and corn leaves were also higher on average, but by only 5% to 7%.

Keep in mind that healthy leaves quickly translocate sugars from photosynthesis *out of the leaf into the phloem tubules, then to roots or seed*. In garden crops we measure brix levels in whatever we eat, such as lettuce leaves or green beans. We've pushed fresh green beans past 12 brix a few times. At that level of sweetness, agronomy experts tell us we shouldn't expect many insect problems.



Xylem (nutrients up to leaves)
Phloem (carries sugars down to roots, seeds and fruit)

Leaf cross-section

To monitor crop quality in the growing season — especially in vegetables and fruit — an optical or digital refractometer can offer useful answers.

It measures total dissolved solids, which are mostly sugars. You read the percent solids as a "brix" percentage, so named after the inventor of the concept, who needed a quick way of checking grapes for winemaking.

We encourage checking treated and untreated corn kernels at the milk stage, when the plant is pumping in sugars for kernel fill.

You can also measure brix in treated and untreated soybean seeds when they are green. Take leaf or seed samples from 5 to 10 plants spaced well apart in the field, then squeeze the bundle onto the refractometer for a representative reading. Take readings at the same time of day, such as early evening.

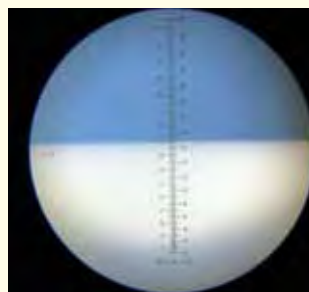
The goal is always to pump maximum photosynthate nutrients into the edible, saleable part of the plant — not just accumulate high sugars in corn or soybean leaves. If leaf sugars reach capacity during a sunny day, photosynthesis slows down. Thus the leaf must pump out its sugars to other parts of the plant quickly. SoySoap helps speed this translocation to seeds, fruit and roots.



To check brix reading, first squeeze leaves or fruit to start flow of juice...



... and let several drops flow onto refractometer prism.



Read brix level through the refractometer lens; record your data.

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