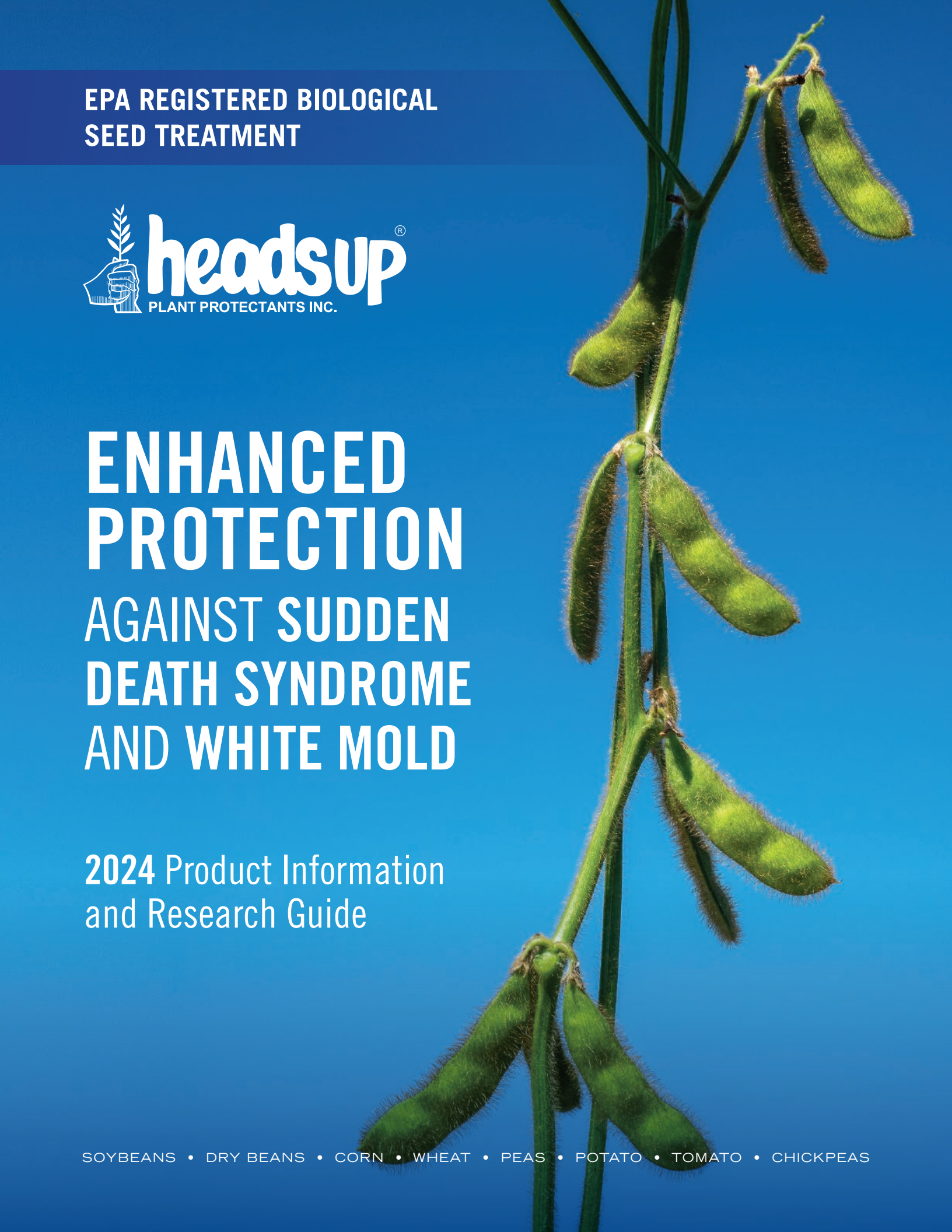
EPA REGISTERED BIOLOGICAL SEED TREATMENT

headsup®
PLANT PROTECTANTS INC.

ENHANCED PROTECTION

AGAINST **SUDDEN DEATH SYNDROME** AND **WHITE MOLD**

2024 Product Information and Research Guide



SOYBEANS • DRY BEANS • CORN • WHEAT • PEAS • POTATO • TOMATO • CHICKPEAS

ABOUT HEADS UP®

From our humble beginnings in Kamsack, Saskatchewan, Canada, to our North American expansion, our roots are deeply seeded in providing natural, reliable and sustainable products to improve the future of farming.

While founded in 1999, Heads Up® Plant Protectants, Inc. has been in motion since the 1970s. A venture that started on a 600-acre hobby farm in east-central Saskatchewan by Joe Dutcheshen has evolved into one of the leading biological crop protection companies in the U.S. and Canada.

A pharmacist and farmer, Joe honed in on his passion for pharmaceutical research and agriculture to develop a biological formulation from naturally occurring plant-extracted biochemicals found in specialty crops. Through persistence and determination and more than 20 years of research, Joe found that certain chemistries activate systemic acquired resistance in crops, which essentially sends signals to the plant to activate its defense system to ward off diseases. The formulation gives the plant a "heads up" to get its defense in place and aids to suppress yield-robbing diseases, such as white mold and sudden death syndrome.

Now, Heads Up® is one of the most effective, economical biological seed treatments on the market for use on soybeans, corn, potatoes, dry beans, peas and wheat, as well as a pre-transplant foliar and root dip for tomato seedlings. And our footprint continues to grow; more than 10 million soybean acres in North America use Heads Up® seed treatment, and in Alberta, Canada, Heads Up® is on 100% of dry bean acres planted.

Heads Up® is an independent, family-owned company based in Saskatoon, Saskatchewan, Canada. Heads Up® Plant Protectant is both an EPA and PRMA (Canada) registered seed treatment in addition to OMRI™ (Organic Materials Review Institute) registered and approved for organic use. Heads Up® continues product testing to refine future formulations, including Heads Up® RTA: a pre-mix liquid product for growers who prefer an alternative to water-soluble powder.

TO LEARN MORE ABOUT HEADS UP®, VISIT US ONLINE AT HEADSUPST.COM

TOP REASONS TO ASK YOUR DEALER FOR **HEADS UP®** SEED TREATMENT

1. PROVEN RESULTS.

Heads Up® has a long history of proven results across the United States and Canada, helping soybean producers control several fungal and bacterial diseases. In over 11 years and 68 trials conducted by the North Central Soybean Research Program, Heads Up® has shown to bring an average yield increase of 2.08 bu/ac when used stand alone or paired with other commercial seed treatments.

2. COMPATIBILITY.

Heads Up® is non-microbial and is compatible with many other seed treatments and inoculants.

3. STACKED MODES OF ACTION.

Heads Up® utilizes a revolutionary mode of action (M.O.A) called systemic acquired resistance (S.A.R). When combined with traditional fungicide/insecticide seed treatment products, Heads Up® gives your seed treatment package additional protection against several key disease robbing pathogens fungicides alone cannot provide.

4. SYSTEMIC, SEASON LONG ACTIVITY.

Heads Up® is active from the time of germination to natural senescence. Because the product works to signal a physiological change, turning on and engaging the plants defenses early, this heightened resistance stays on and active all-season long.

5. BROAD SPECTRUM.

Heads Up® is registered for use on several crops and a variety of fungal diseases. See our website for a complete list of registrations and research data.

6. NO TIME-TO-USE RESTRICTIONS.

Heads Up® does not contain any living organisms, and can be applied to your seed days, weeks or months prior to planting.

7. EASILY APPLIED.

Because Heads Up® is applied as a seed treatment, it can be applied on request by your seed dealer meaning no extra work to the grower. The product will arrive to your farm pre-treated on your seed.

8. OMRI LISTED.

The product is OMRI listed and approved for organic use.

products available OMRI LISTED™

9. LOW USE RATE.

Heads Up® is sold as a highly concentrated dry powder and must be mixed into a solution before applying through seed treating equipment. The product is applied at a very low use rate and changes overall water volume at the time of treatment only marginally.

10. EXCELLENT VALUE.

Heads Up® Seed Treatment costs less than half the price of a single bushel of soybeans. Priced similar to an inoculant, it is an affordable, valuable tool in a total seed care package.

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heads up®
PLANT PROTECTANTS INC.

NOW AVAILABLE

HEADS UP® RTA SEED TREATMENT

We're delivering a new, ready-to-apply formulation with a low use rate of 0.5 oz/cwt. Each jug treats 400 units of soybean seed, is compatible with other seed treatments and has a two-year shelf life. Contact us for more information, or to set up a product demo!

Available in 100 fl. ounce, 15-gallon, and 30-gallon container sizes.
100 fl. ounces treats 400 units of soybean seed.

TESTIMONIALS

"We have used Heads Up on our farm and include it as part of our seed treatment packages that we offer in our ag retail business. It is very simple and easy to apply. It mixes up really well. In our side-by-side trials we have done, we saw a 2 bushel increase over the check, with very little white mold present."

-Matthew Adrian, Adrian Seed Co, MINN.

"I had two different farms where I ran Heads Up trials. Both farms had white mold and one also had areas of SDS. From my observations, there was a visual difference in white mold pressure between the Heads Up and non. The soys treated with Heads Up still showed some white mold pressure but I would say it was 1/3 to 1/2 less pressure. In heavy white mold areas, the yield difference was 3+ bu/ac, advantage Heads Up. When I look at whole field differences from both farms where disease pressure varies it was 1.8 bu/ac, advantage Heads Up. SDS was observed on the untreated, I struggled to find SDS where Heads Up was applied."

-Justin S, MICH.

"We had a lot of white mold pressure in our area this year and the soybeans treated with Heads Up definitely stood out. We saw a 7-10bu/ac yield advantage in our trials with using the Heads Up product and our security guard treatment together."

-Ty, NEB.

"We have been using Heads Up for two years and continue to use it as we have seen it benefit our yields and better overall plant health."

-Cheney V, MINN.

"I work for Hefty Seed Company out of Wood River, Nebraska. This is our third year using Heads Up and this year we actually made it part of our standard seed treatment. Every soybean that gets treated gets Heads Up, whether it's our Hefty Soybeans or custom treat for other companies. Our white mold pressure was starting to get out of control, so that is why we initially started using it. Since then, our pressure has dropped by 80-85% I would estimate and Heads Up being the only difference. Overall, I am extremely happy with how Heads Up has helped my growers."

-Tristan N, NE

DATA AND TRIALS RESEARCH

SOYBEANS

HEADS UP® PLANT PROTECTANTS
2023 SOYBEAN TRIALS

Be on the upside of crop protection.

Maximize results with Heads Up® and Heads Up® RTA seed treatments. These no-fuss formulations deliver ultimate control of yield-robbing diseases, like sudden death syndrome, white mold, pythium and rhizoctonia root rot/damping off, and pack a positive yield punch.

Heads Up® seed treatments feature:

↑ Next-level disease control over a broad spectrum of fungal and bacterial diseases

↑ Consistent yield advantage

↑ Ease of use

↑ Peace of mind, low-use rate

APPLICATION EFFECTIVENESS

Heads Up® can be applied in two ways:

- A water-soluble formulation (Heads Up®)
- A dump-and-go, liquid formulation (Heads Up® RTA)

Both are registered preplant seed treatments that are proven to activate natural plant defenses to combat diseases all season and deliver better yield, saving time and money in input cost. On average, Heads Up®-equipped seeds produce an additional two bushels of healthy soybeans per acre, improving ROI.

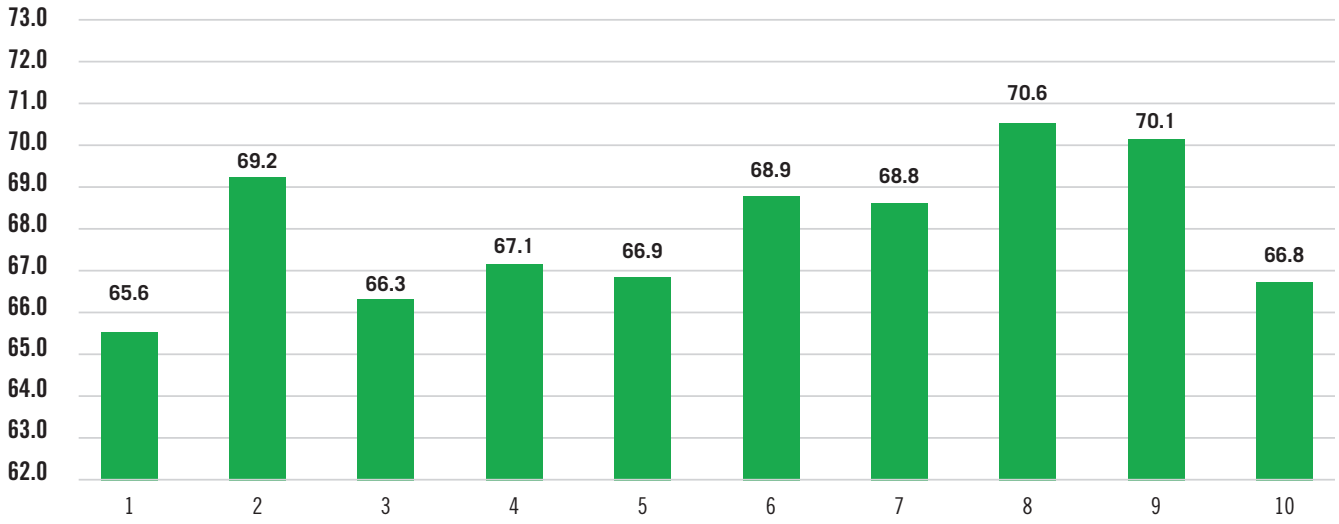
PERFORMANCE ADVANTAGE

"We have not seen any white mold in our fields in the last three years since we started using Heads Up®. Prior to that, we saw white mold frequently on our acres. I am very happy with the Heads Up® product overall. I am going to continue to use it and promote it to my neighbors." *— Roger, grower, Wisconsin*

ILLINOIS (WYOMING, ILLINOIS)

HEADS UP® ADDED AN AVERAGE OF +2.13 BU/AC TO OTHER SEED TREATMENT PACKAGES. BREAK EVEN OF HEADS UP® IS ROUGHLY 0.33 BU/AC.

FINAL YIELD (BU/AC)



TRT NO.	TREATMENT NAME	ROI
1	CST	
2	Heads Up® RTA + CST	+ $39.20/ac with Heads Up®
3	Ilevo + CST	
4	Heads Up® RTA + Ilevo +CST	+ $5.60/ac with Heads Up®
5	Saltro + CST	
6	Heads Up® RTA + Saltro + CST	+ $20/ac with Heads Up®
7	Heads Up® + Ceramax + CST	
8	Heads Up® + Trunemco + CST	
9	Heads Up® + BioST + CST	
10	Untreated	

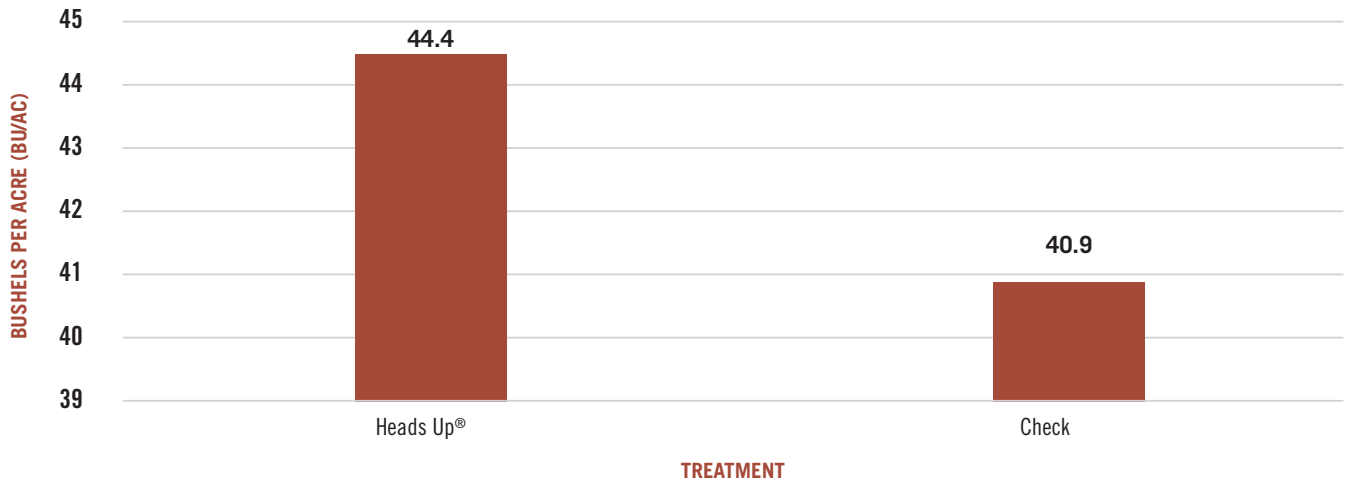
Entire trial area was inoculated with 2g/fow foot of SDS inoculum at time of planting via Gandy Box.
CST = Commercial seed treatment f/l base
Ilevo is a registered trademark of BASF.
Saltro is a registered trademark of a Syngenta Group Company.

ROI calculations assume a $12 soybean price and $4.00 cost per unit of Heads Up® RTA.

NORTH DAKOTA (FARGO, NORTH DAKOTA)

HEADS UP® TREATED BEANS RETURNED + $38.50 PER ACRE

Field: Peterson Farm Seed



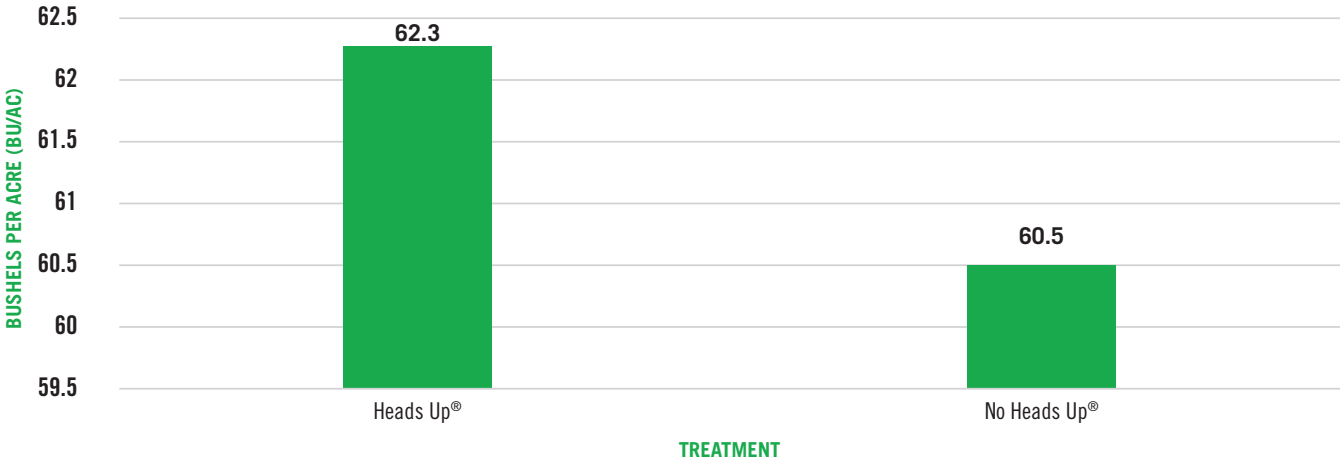
Heads Up® yielded 3.50 BU/AC more than the check.

All product and company names are trademarks of their respective holders. Use of them does not imply an affiliation with or endorsement from them. ROI calculations assume a $12 soybean price and $3.50 cost per unit of Heads Up® Plant Protectant.

OHIO SOUTHWEST OHIO

HEADS UP® TREATED BEANS RETURNED + $18.10 PER ACRE OVER CHECK

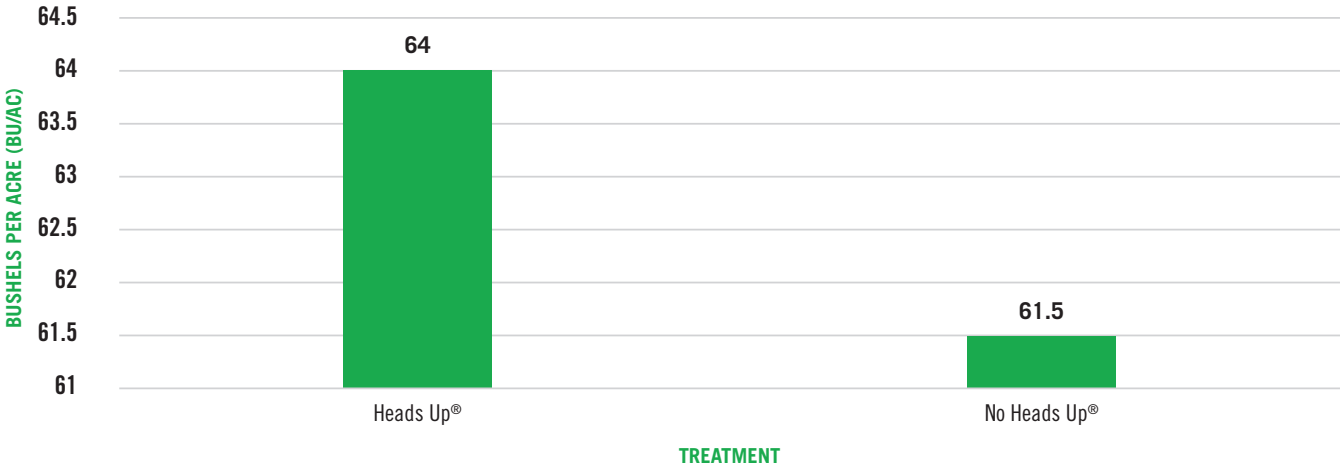
GH 3132 E3 w/Cruiser® 5FS



GH 3132 E3 w/Cruiser and Heads Up® yielded 1.8 BU/AC more than GH 3132 E3 with Cruiser alone.

HEADS UP® TREATED BEANS RETURNED + $26.50 PER ACRE OVER CHECK

GH 3762 E3 w/Cruiser® 5FS



GH 3762 E3 w/Cruiser and Heads Up® yielded 2.5 BU/AC more than GH 3762 E3 with Cruiser alone.

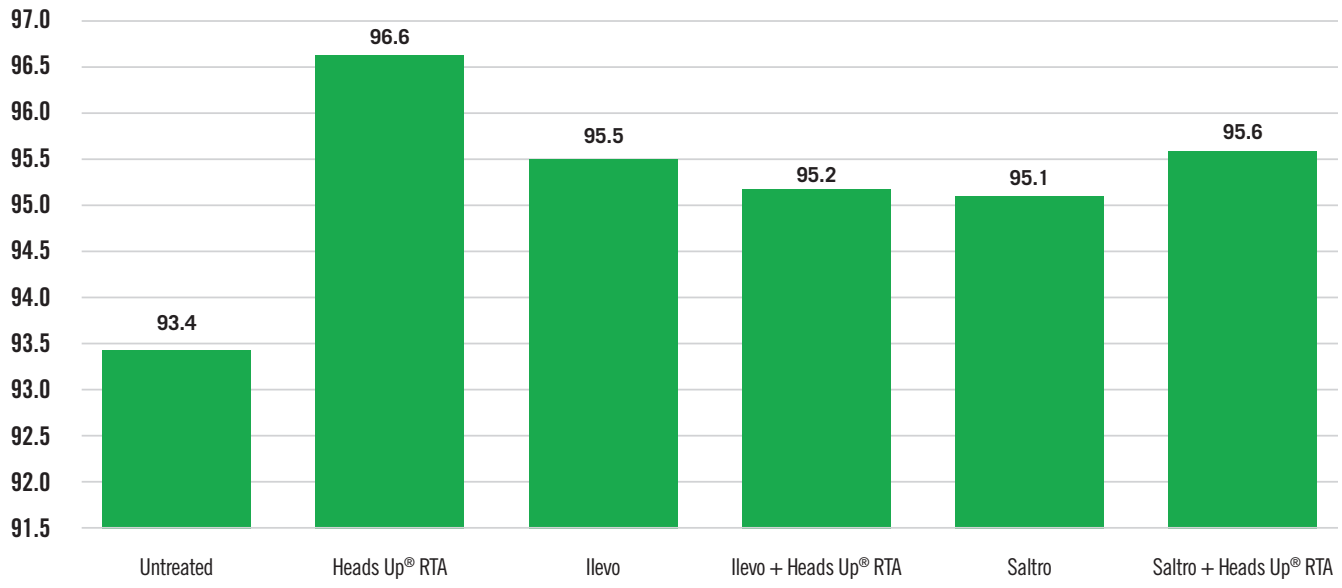
Cruiser® 5FS is a trademark of Syngenta.
Seed treatment — Thiamethoxam
All product and company names are trademarks of their respective holders. Use of them does not imply an affiliation with or endorsement from them.
ROI calculations assume a $12 soybean price and $3.50 cost per unit of Heads Up® Plant Protectant.

OHIO TROY, OHIO

+3.2 BU/AC OVER UNTREATED
+ $34.40 BU/AC WITH HEADS UP®!

BUCKEYE AG

SDS INOCULATED TRIAL 2023
YIELD BU/AC



BUCKEYE AG

SDS % INCIDENCE

Base Seed Treatment = common commercial base fungicide/insecticide seed treatment.
Ilevo is a registered trademark of BASF.
Saltro is a registered trademark of a Syngenta Group Company.
All other trademarks are property of their respective owners.
All product and company names are trademarks of their respective holders. Use of them does not imply an affiliation with or endorsement by them.
ROI calculations assume a $12 soybean price and $4.00 cost per unit of Heads Up® RTA.

SOYBEAN WHITE MOLD SEED TREATMENT TRIAL

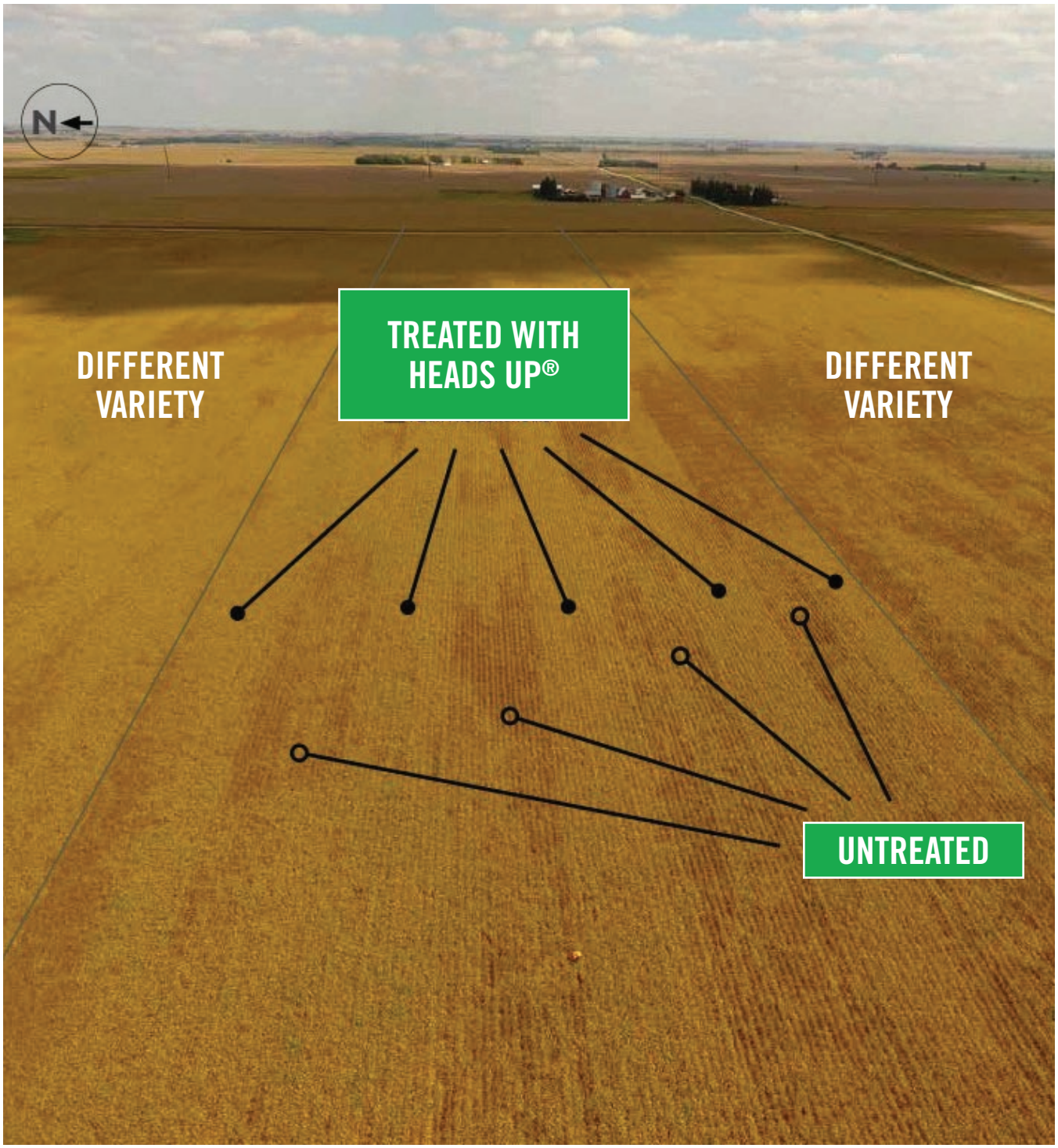
Denmark, Wis. 9/5/19
STUDY CONDUCTOR T H AGRI-CHEMICALS

SEED TREATMENT STRIP TRIAL

Base Fungicide/Insecticide Seed Treatment

Base Fungicide/Insecticide Seed Treatment + **HEADS UP®**

Brown patches in strips to the left and right of the dark green Heads Up®, base fungicide, insecticide seed treated strip can be attributed to early senescence of soybeans, a symptom of sclerotinia white mold. **The Heads Up®, base fungicide, insecticide seed treatment outyielded the base fungicide/insecticide seed treatment by 7.68 bushels per acre.**



Above: Heads Up® Seed Treatment vs Untreated Soybean Trial - Clear Lake, Iowa.
Dark patches attributed to early die down caused by Soybean SDS.
Heads Up® treated beans had a 3.9 bu/ac yield advantage over untreated in trial.

DATA AND TRIALS RESEARCH

DRY BEANS

HEADS UP® PLANT PROTECTANTS
2023 DRY BEAN TRIALS

Dry beans are no stranger to fungal diseases. In fact, they face many of the same fungal threats that soybeans do, including white mold and sudden death syndrome (SDS).

Being proactive with Heads Up® and Heads Up® RTA seed treatments can help keep these yield-robbing diseases at bay. As ready-to-apply, no-fuss formulations, Heads Up® seed treatments have proven performance, activating the plant's natural defense system to fight for yield.

APPLICATION EFFECTIVENESS

Heads Up® can be applied in two ways:

- A water-soluble formulation (Heads Up®)
- A dump-and-go, liquid formulation (Heads Up® RTA)

Growers should apply Heads Up® seed treatments in the spring as part of their pre-treatment for planting — an opportune time to get ahead of sclerotia, the soilborne fungus that causes white mold, before weather conditions exacerbate the disease. They also help ward off root rot and post-emergence damping off caused by Rhizoctonia solani.

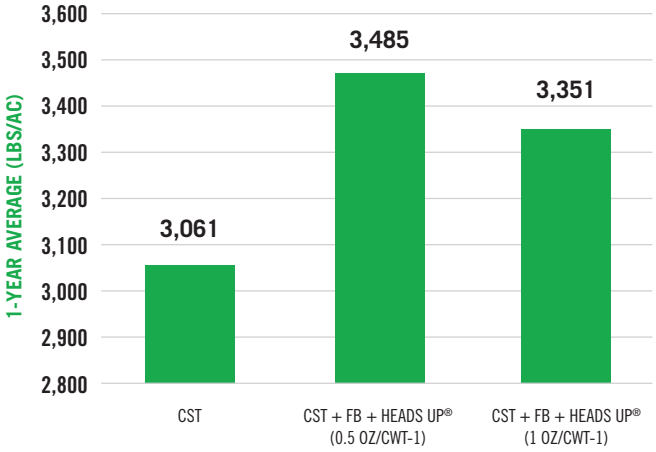
PERFORMANCE ADVANTAGE

MICHIGAN STATE UNIVERSITY TRIALS

BLACKBEARD TRIAL

+424 LBS/AC YIELD ADVANTAGE WITH CRUISER® 5FS SEED TREATMENT (CST) + HEADS UP® OVER SINGLE APPLICATION CST

+290 LBS/AC YIELD ADVANTAGE WITH CST + FUNGICIDE BASE + HEADS UP® OVER SINGLE APPLICATION CST



CST + Heads Up® (0.5 oz/cwt-1) were applied together in slurry and in a single application.

CST + Fb (fungicide base) + Heads Up® (1 oz/cwt) received a 2x rate of Heads Up® applied as an overtreatment on previously treated seed.

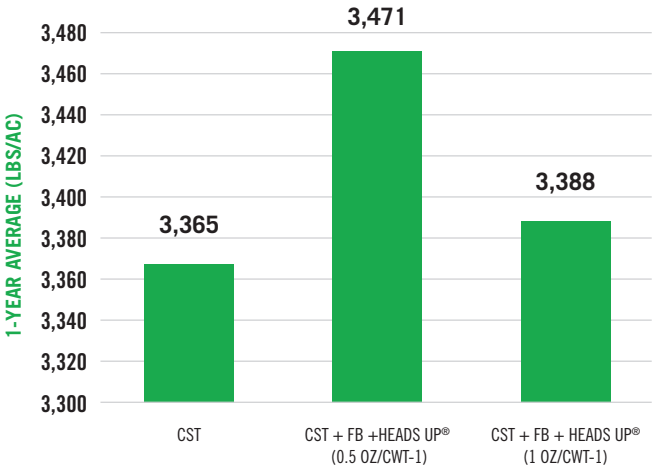
Cruiser® 5FS is a trademark of Syngenta

Seed treatment — Thiamethoxam

SPECTRE TRIAL

+106 LBS/AC YIELD ADVANTAGE WITH CST + HEADS UP® OVER SINGLE APPLICATION CST

+23 LBS/AC YIELD ADVANTAGE WITH CST + FUNGICIDE BASE + HEADS UP® OVER SINGLE APPLICATION CST



CST + Heads Up® (0.5 oz/cwt-1) were applied together in slurry and in a single application.

CST + Fb (fungicide base) + Heads Up® (1 oz/cwt) received a 2x rate of Heads Up® applied as an overtreatment on previously treated seed.

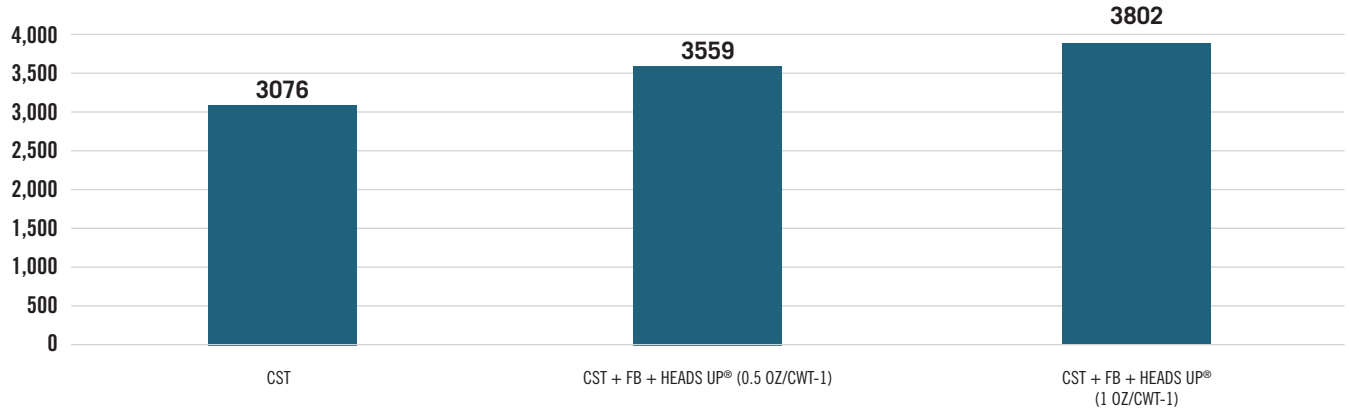
Cruiser® 5FS is a trademark of Syngenta

Fungicide base — Thiamethoxam

2022 YIELD TRIALS

BLACKBEARD TRIAL (BAY COUNTY)

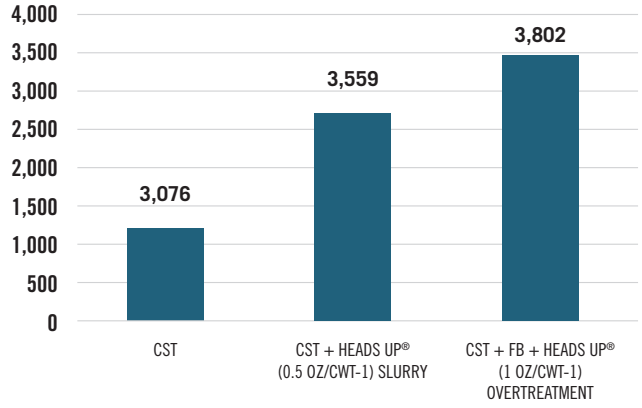
CST + HEADS UP® 0.5 OZ/CWT (SLURRY) VS. CST = YIELD DIFFERENCE 483 LBS/AC.
CST + HEADS UP® 1.0 OZ/CWT (OVERTREATMENT) VS. CST = YIELD DIFFERENCE 726 LBS/AC.



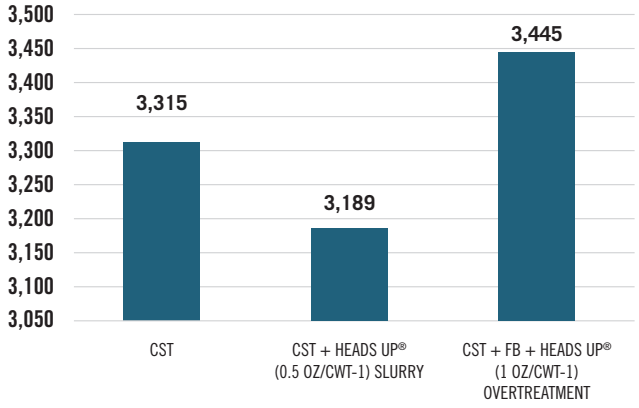
MICHIGAN TRIAL (BAY, HURON, SANILAC AND TUSCOLA COUNTIES) *(Scott Bales, Dry Bean Systems Specialist, Michigan State University)*

+214.3 LBS/AC AVG INCREASE AT 0.5 OZ/CWT
+380.8 LBS/AC AVG INCREASE AT 1.0 OZ/CWT

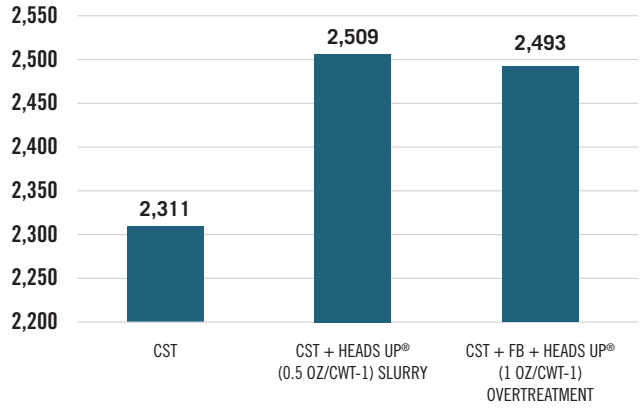
BAY COUNTY YIELD (LBS/AC)



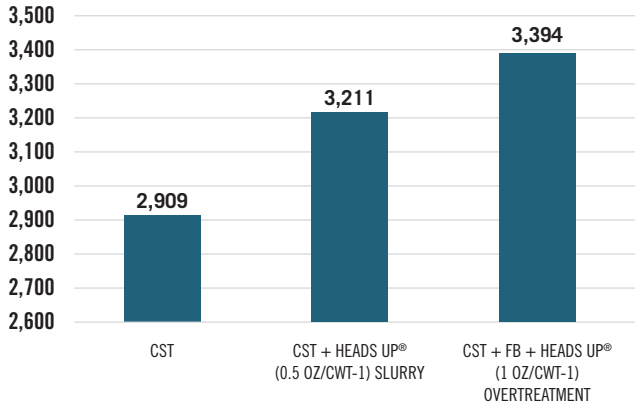
SANILAC COUNTY YIELD (LBS/AC)



HURON COUNTY YIELD (LBS/AC)



TUSCOLA COUNTY YIELD (LBS/AC)

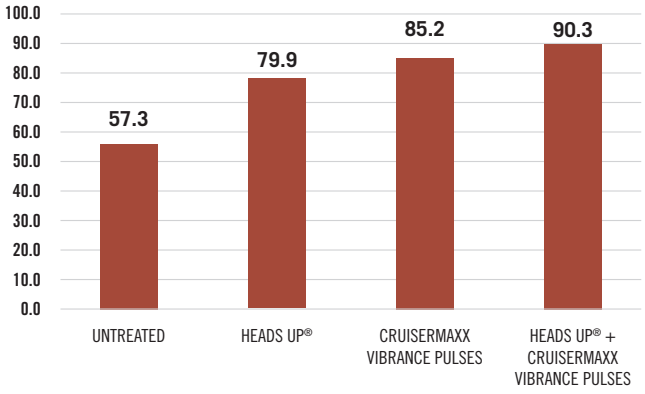


Across Blackbear trials in select counties of Michigan, MSU extension found Heads Up® improves yield by an average of 214.3 lbs/ac when applied at 0.5 oz/cwt (slurry) and used with CST compared to CST alone. When applied at 1 oz/cwt (overtreatment) with CST, Heads Up® increased yield by 380.8 lbs/ac on average.

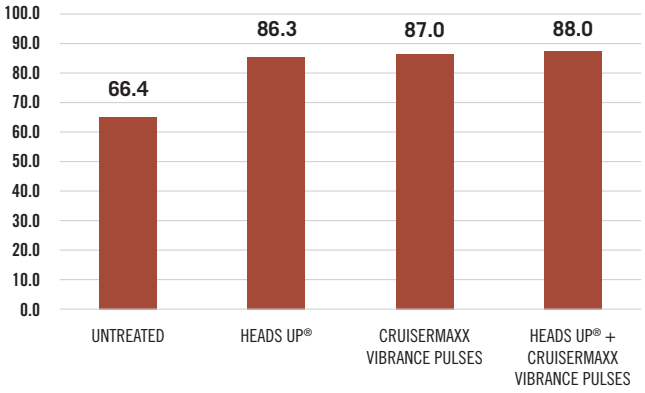
IMPROVE EMERGENCE (DEWITT, MI)

MID-MICHIGAN AGRONOMY
CLASS: SNAP BEANS; VARIETY: BLUE LAKE BUSH

PLOT YIELD (CWT)



EMERGENCE % OF PLOT (@26 DAP; 13 DAE)

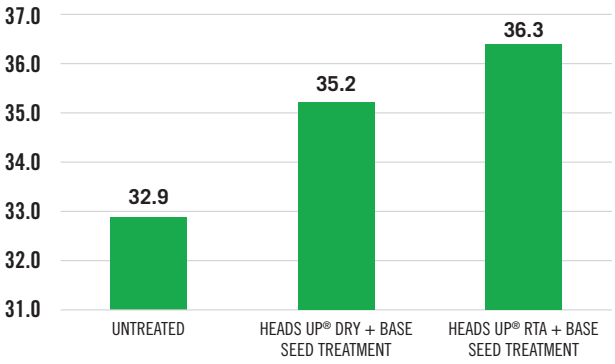


In snap bean trials conducted by Mid-Michigan Agronomy, Heads Up® improved overall emergence of the plot by 20% when compared to untreated and 21.6% when used with CruiserMaxx Vibrance Pulses.

IMPROVE IRRIGATED DRY BEAN YIELD (YORK, NE)

NE AG RESEARCH
CLASS: DRY BEANS; VARIETY: GREAT NORTHERN
+2.3 BU/AC INCREASE
+3.4 BU/AC INCREASE

YIELD EXPRESSED IN (BU/AC)



Heads Up® increases yield by 2.3 bu/ac when used with base seed treatment compared to untreated, and Heads Up® RTA proves to grow yield by 3.4 bu/ac when used with base seed treatment compared to untreated.

NE Ag Research used Great Northern seed variety.

Data taken from 2022 university and third-party research conducted in Michigan and Nebraska.

HEADS UP® PLANT PROTECTANTS
2022 DRY BEAN TRIALS

The newest line of defense for your dry bean seed, Heads Up® and Heads Up® RTA Seed Treatments have proven performance against two major yield-robbing diseases — rhizoctonia root rot/damping off and white mold, one of the most devastating diseases for legume crops. Reduce your risk of disease and save on costs with these no-fuss formulations that activate biological plant defenses for season-long control.

APPLICATION EFFECTIVENESS

Heads Up® can be applied in two ways:

- A water-soluble formulation (Heads Up®)
- A dump-and-go, liquid formulation (Heads Up® RTA)

Both are registered to protect against white mold, root rot and post-emergence damping off (caused by Rhizoctonia solani). A good dry bean disease control plan involves applying treatment in the spring as a pre-treatment for planting.

PERFORMANCE ADVANTAGE: HEADS UP® DELIVERS

INCREASE YIELD (MICHIGAN — BAY, HURON, SANILAC, TUSCOLA) *(Scott Bales, Dry Bean Systems Specialist, Michigan State University)*
+214.3 LBS/ACRE AVG INCREASE at 0.5 oz/cwt
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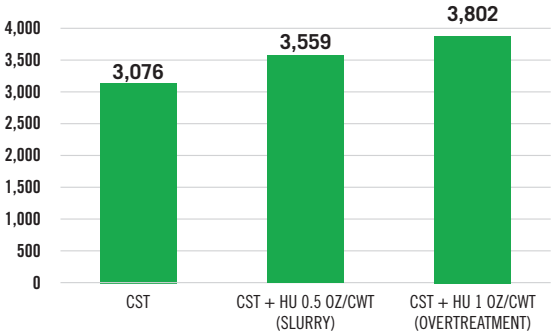
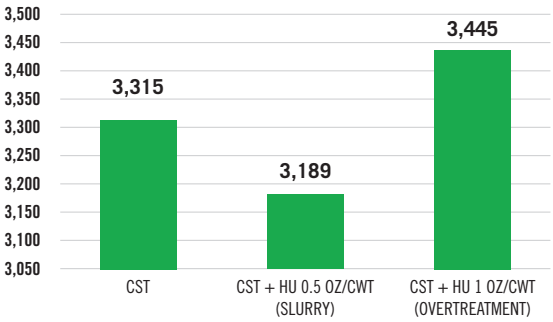
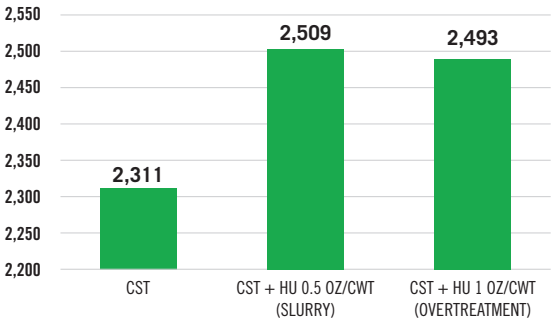
BAY COUNTY YIELD (LBS/AC)



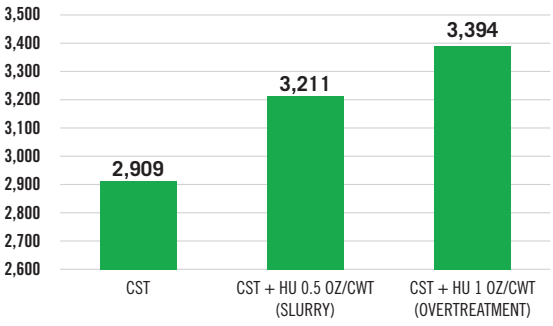
SANILAC COUNTY YIELD (LBS/AC)



HURON COUNTY YIELD (LBS/AC)



TUSCOLA COUNTY YIELD (LBS/AC)



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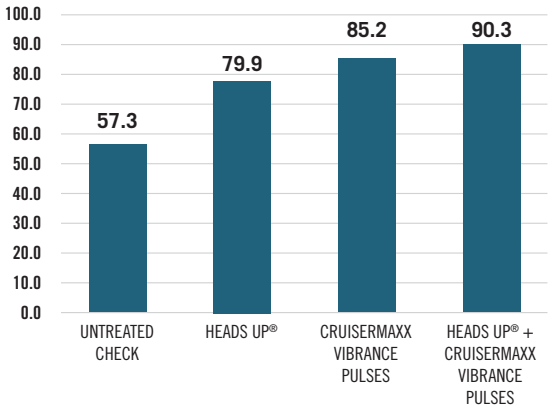
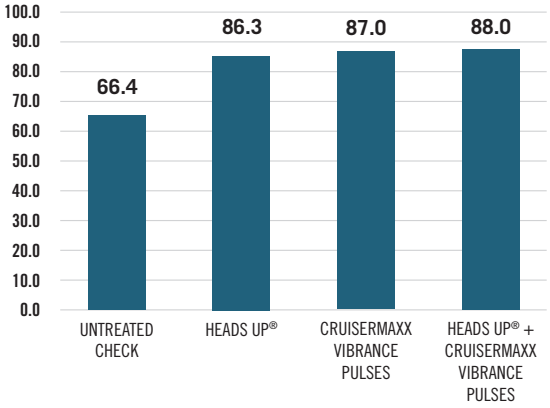
IMPROVE EMERGENCE (DEWITT, MICH.)

MID-MICHIGAN AGRONOMY
CLASS: SNAP BEANS; VARIETY: BLUE LAKE BUSH

PLOT YIELD (CWT)



EMERGENCE % OF PLOT (@26 DAP; 13 DAE)

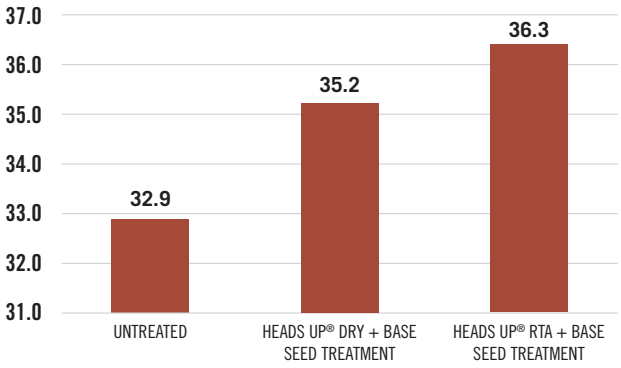


In snap bean trials conducted by Mid-Michigan Agronomy, Heads Up® improved overall emergence of the plot by 20% when compared to untreated and 21.6% when used with CruiserMaxx Vibrance Pulses.

IMPROVE IRRIGATED DRY BEAN YIELD (YORK, NEB.)

NE AG RESEARCH
CLASS: DRY BEANS; VARIETY: GREAT NORTHERN
+2.3 BU/ACRE INCREASE
+3.4 BU/ACRE INCREASE

YIELD EXPRESSED IN (BU/AC)



Heads Up® increases yield by 2.3 bushels/acre when used with base seed treatment compared to untreated, and Heads Up® RTA proves to grow yield by 3.4 bushels/acre when used with base seed treatment compared to untreated.

NE Ag Research used Great Northern seed variety.

Data taken from 2022 university and third-party research conducted in Michigan and Nebraska.

*"Through four years of trials at Brooks and Lethbridge (Alberta), **Heads Up®** often outperformed the other products. We were looking at (foliar) fungicides for the management of white mold, but we weren't seeing a transformation in the ability to control white mold. Heads Up® showed significant improvement in most years, or a trend to improvement in others."*

– Dr. Michael Harding, Plant Pathologist, Alberta Agriculture and Forestry

EVALUATING FOLIAR FUNGICIDES FOR CONTROLLING SCLEROTINIA WHITE MOULD ON DRY BEAN CROPS

Michael Harding and Brian Storozynsky, Alberta

Agriculture and Forestry Completed Research | Beans | 2013, 2014, 2015 and 2016
Yield | New Growers and Producers

A better way to protect beans from white mould

IN 2017, ALL DRY BEAN SEED BROUGHT TO ALBERTA WAS TREATED WITH A PRODUCT KNOWN AS HEADS UP®. RESEARCH FUNDED BY APG AND OTHERS HELPED MAKE THIS ADVANCE POSSIBLE.

Until this year, the agronomic package for dry bean production in Southern Alberta might have been described as a case of two out of three isn't bad.

That's according to Michael Harding, Brooks-based Research Scientist, Plant Pathology, with Alberta Agriculture and Forestry.

"We now have good early-maturing, high-yielding varieties," Harding said, "and pretty good tools for weed control. But disease has continued to be an issue. In most years, white mould is the biggest or one of the biggest constraints to dry bean production in southern Alberta."

In 2013, Harding and a team of researchers embarked on a four-year study to evaluate foliar fungicides for controlling white mould in dry beans.

Among the products for testing was one that was unique. It was a product derived from saponins from a plant called Chenopodium quinoa, and had been brought to Harding by an agribusiness entrepreneur who'd wanted to see if it provided a white mould response and hoped to find a market for it.

"It's a product that's normally applied as a seed treatment," Harding said. "White mould usually comes in July or August, so it was hard to imagine it would be effective. It turned out to have a significant effect, possibly due to a phenomenon known as resistance priming. You can prime the plant to use its own natural resistance to the disease. It's a different way of poking at the problem."

A NEW APPROACH ON WHITE MOULD

Through four years of trials at Brooks and Lethbridge, Heads Up® often outperformed the other products. Before long, Harding's results had helped complete a package of performance data that would ultimately support its registration.

The product, now known commercially as Heads Up® Plant Protectant, was used to treat all dry bean seed brought to Alberta by Viterra in 2017.

"We were looking at fungicides for the management of white mould, but we weren't seeing a transformation in the ability to control white mould," Harding said. "That one product showed significant improvement in most years, or a trend to improvement in others. Normally we'd start in the lab and the greenhouse and do growth cabinet trials. In this case, we clearly saw the potential of this product and fast-tracked it to small plot trials."

Another component of this study looked at the use of micro-nutrients within a white mould management program. Despite flashes of performance, no configuration performed consistently enough to offer a real advantage, in Harding's eyes.

Still, this 2013-16 study helped bring dry bean growers a piece of the agronomic puzzle they've long lacked: a new way to manage white mould.

"Part of our job is to try things out so the growers don't have to, so there's less risk for them," Harding said. "That's the purpose. We tried a product out and it was adopted by industry. In that sense, it's one of those projects that has been really satisfying."

DATA AND TRIALS RESEARCH

CORN

HEADS UP® PLANT PROTECTANTS
2023 MIDWEST CORN TRIALS

Protect your seed investment with peace of mind.

Did you know you can apply Heads Up® and Heads Up® RTA to corn seed? As preplant seed treatments, Heads Up® and Heads Up® RTA are low-cost solutions that help fend off different yield-robbing bacterial and fungal diseases in corn, such as common rust which can lead to poor grain fill and lodging from stalk rot. The ready-to-apply, no-fuss formulations activate the natural biological defenses in the plant for season-long control.

APPLICATION EFFECTIVENESS

Heads Up® can be applied in two ways:

- In a water-soluble formulation
- As a dump-and-go liquid formulation (Heads Up® RTA)

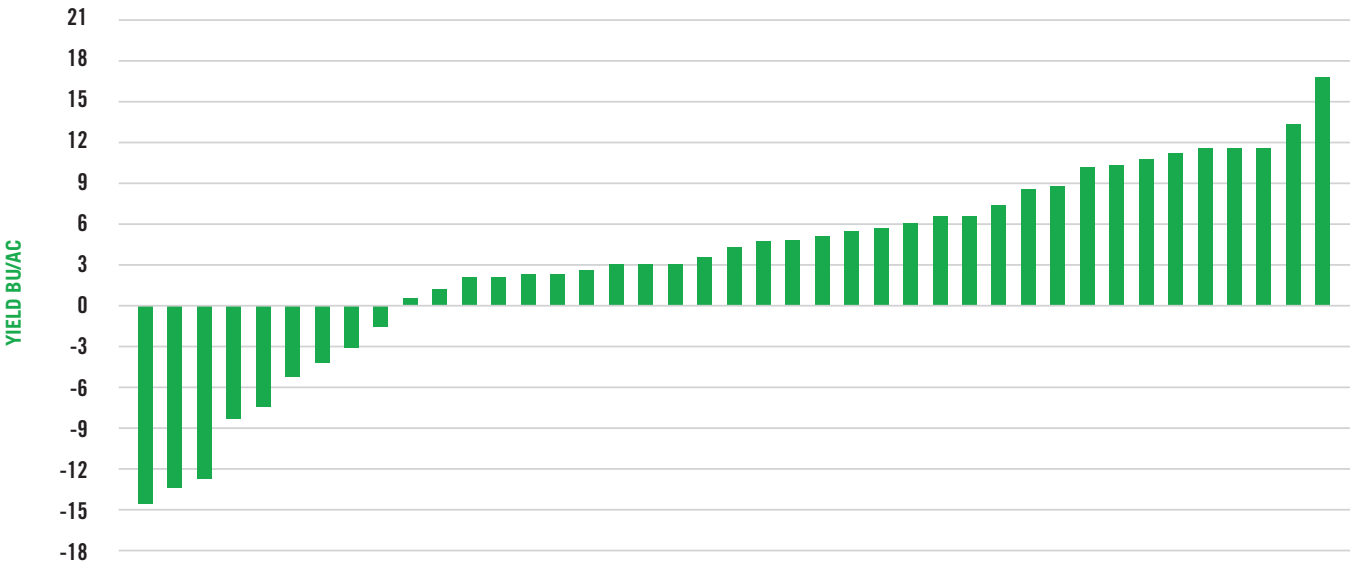
Both are EPA-registered biologicals that induce season-long systemic disease resistance to ward off a broad spectrum of disease pathogens commonly found in corn. Heads Up® has a stable shelf life and can be applied to corn well in advance of planting.

PERFORMANCE ADVANTAGE

Heads Up® delivers!

In 2023, Heads Up® and Heads Up® RTA provided consistent yield improvement on corn crops across 11 Midwest locations, from Indiana and Illinois to Iowa and Nebraska. According to the Independent Professional Seed Association's (IPSA) 2023 Midwest corn trials, Heads Up® delivered, on average, a 3.25 bu/ac increase across all yield trials — a 75.6% positive yield advantage.

PLUS 3.25 BU/AC 75.6% POSITIVE YIELD ADVANTAGE



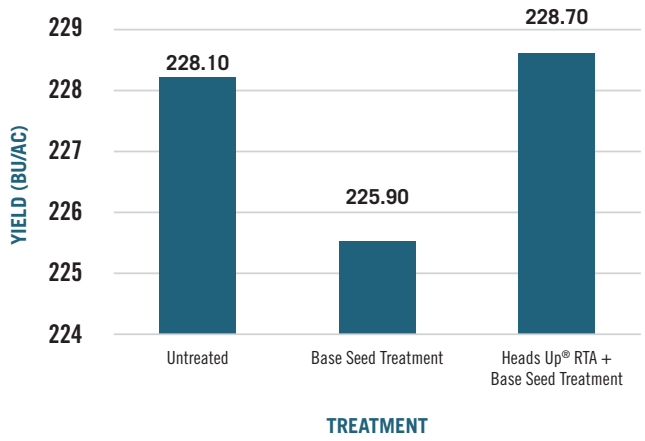
Replicated Field Plots
Cooperator: IPSA CORN Central Location Trial
Location: Midwest Locations
Year: 2022, 2023
Reps: 123

The following data is a sampling from IPSA's 2023 Midwest corn trials. To see the complete data, visit our website at HeadsUpST.com/Crops/Corn/ or connect with your local Heads Up® rep.

IOWA (AMES AND CARROLL)

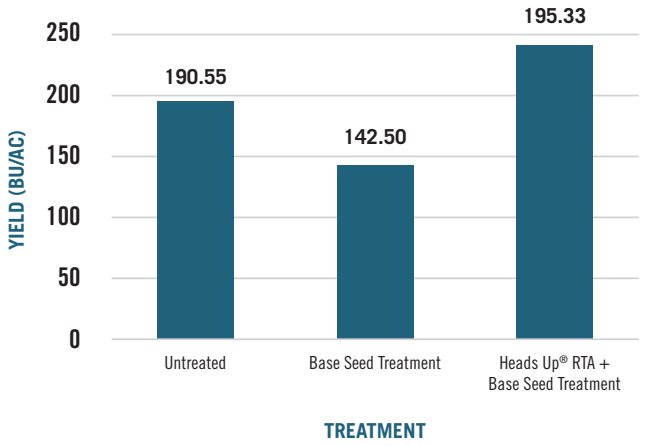
+2.8 BU/AC AVG INCREASE OVER BASE SEED TREATMENT (Ames)
+52.83 BU/AC AVG INCREASE OVER UNTREATED (Carroll)

AMES, IOWA
72 X 46



Base Seed Treatment & Heads Up® RTA yielded 0.6 bu/ac more than Untreated and 2.8 bu/ac more than Base Seed Treatment.

CAROLL, IOWA
43 X 60

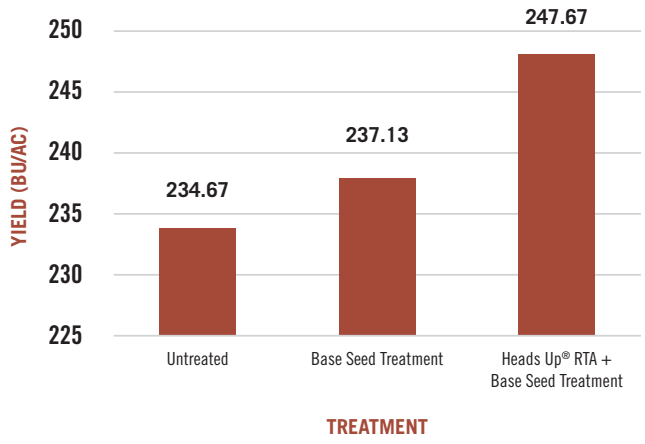


Base Seed Treatment & Heads Up® RTA yielded 52.83 bu/ac more than Untreated and 4.78 bu/ac more than Base Seed Treatment.

ILLINOIS (ATLANTA AND MENDOTA)

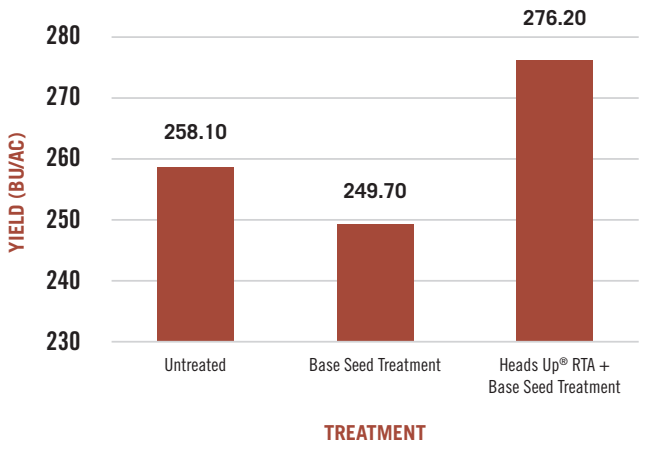
+13 BU/AC AVG INCREASE OVER UNTREATED (Atlanta)
+26.5 BU/AC AVG INCREASE OVER BASE SEED TREATMENT (Mendota)

ATLANTA, ILLINOIS
43 X 60



Base Seed Treatment & Heads Up® RTA yielded 13 bu/ac more than Untreated and 10.54 bu/ac more than Base Seed Treatment.

MENDOTA, ILLINOIS
43 X 60

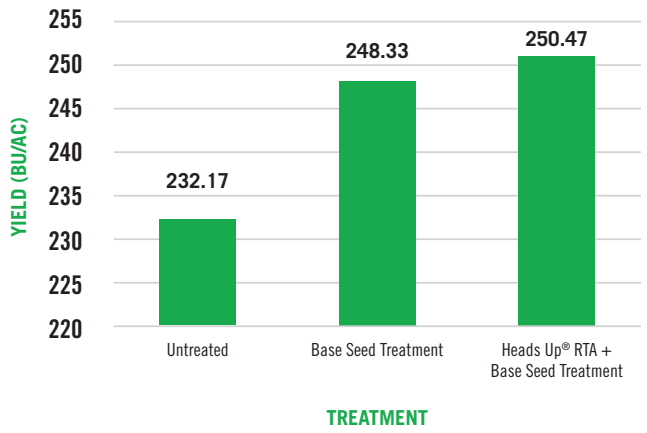


Base Seed Treatment & Heads Up® RTA yielded 18.1 bu/ac more than Untreated and 26.5 bu/ac more than Base Seed Treatment.

INDIANA (BLUFFTON AND CRAWFORDSVILLE)

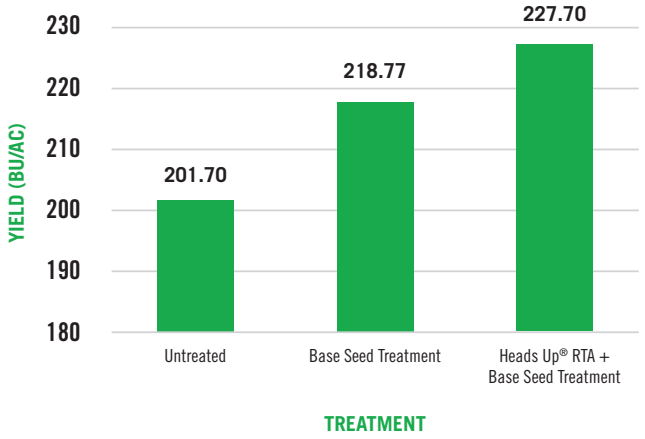
+18.3 BU/AC AVG INCREASE OVER UNTREATED (Bluffton)
+26 BU/AC AVG INCREASE OVER UNTREATED (Crawfordsville)

BLUFFTON, INDIANA
43 X 60



Base Seed Treatment & Heads Up® RTA yielded 18.3 bu/ac more than Untreated and 2.14 bu/ac more than Base Seed Treatment.

CRAWFORDSVILLE, ILLINOIS
43 X 60

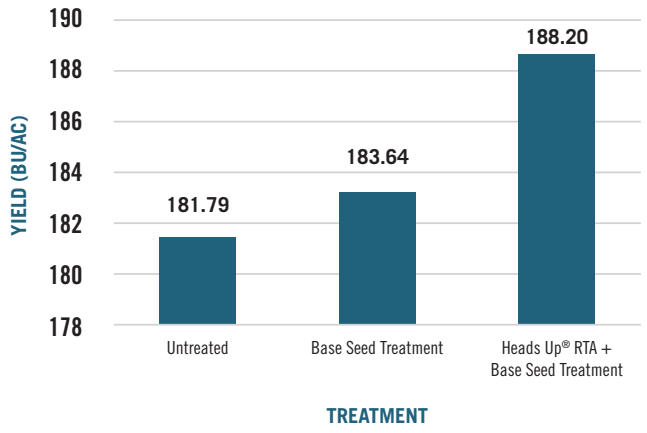


Base Seed Treatment & Heads Up® RTA yielded 26 bu/ac more than Untreated and 8.93 bu/ac more than Base Seed Treatment.

NEBRASKA (ELKHORN AND TEKAMAH)

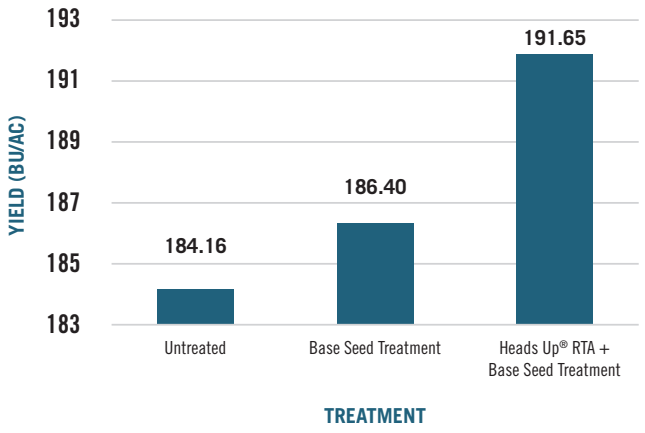
+13 BU/AC AVG INCREASE OVER UNTREATED (Atlanta)
+26.5 BU/AC AVG INCREASE OVER BASE SEED TREATMENT (Mendota)

ELKHORN, NEBRASKA
72 X 46



Base Seed Treatment & Heads Up® RTA yielded 6.41 bu/ac more than Untreated and 4.56 bu/ac more than Base Seed Treatment.

TEKAMAH, NEBRASKA
72 X 46



Base Seed Treatment & Heads Up® RTA yielded 7.49 bu/ac more than Untreated and 5.25 bu/ac more than Base Seed Treatment.

HOW HEADS UP® WORKS:

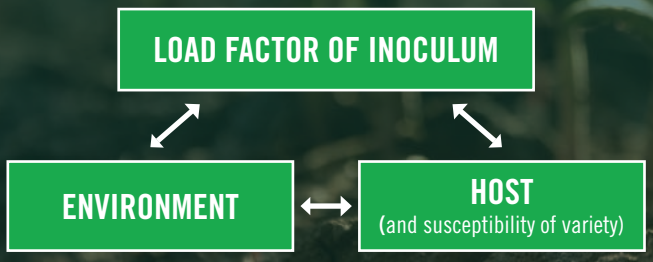
WHAT IS SYSTEMIC ACQUIRED RESISTANCE?

SYSTEMIC ACQUIRED RESISTANCE

All plants have innate resistance and the ability to defend themselves against fungal and bacterial disease. Extensive breeding in soybeans has led to the ability for many seed companies to be able to rank their seed varieties from moderately susceptible to moderately resistant against different disease pathogens. These rankings are based on field tolerances exhibited as a result of genetic selections/crossing.

HOW HEADS UP® WORKS THROUGH S.A.R.

1. When a plant is attacked by a fungal disease pathogen (for example: ascospores, which infect soybeans at R3 (end of flowering/ beginning pod development)), the plant, realizing it is under attack, stimulates defensive "warning signals" which translocate throughout the plant and stimulate/evoke innate defense. This signaling event activates the key defense pathways, i.e. jasmonic and salicylic acid, leading to the accumulation of Salicylic Acid (helps to stop localized infection), and enables P.R. (pathogenesis related) proteins.
2. While the defensive signaling at infection will help to slow down the spread of infection and in turn prevent future yield loss, yield loss depends on factors associated to the disease triangle below. Yield loss will be greater for some diseases (like Sclerotinia sclerotiorum) if you have an extremely wet, cloud covered environment, with a high load factor of sclerotia in the soil and a susceptible soybean cultivar.



3. **HEADS UP®, WHILE NOT ACTIVE ON THE DISEASE ITSELF, STIMULATES THE DEFENSIVE ABILITIES OF THE PLANT UPON GERMINATION.** In turn, by early activation of the key defensive pathways, which happens prior to the infection of the pathogen, the plant is able to better utilize its genetic resistance by "priming" or establishing itself in a "ready state" before disease sets in.
4. **THIS UNIQUE MODE OF ACTION (S.A.R.) HAS SHOWN A SIGNIFICANT EFFECT IN REDUCING YIELD LOSS BY EARLY DISEASE RESISTANCE PRIMING.** Systemic acquired resistance, while not active on any particular disease itself, has proven to be a broad spectrum systemic and provides a full season response.
5. For a complete strategy, always pair Heads Up® Seed Treatment with a variety selected to best suit your unique growing environment. Heads Up® is compatible with other fungicide/ insecticide seed treatments or inoculants and can be used in seed treatment blends for multiple modes of action. The product can also be used alone and is OMRI certified for Organic use.

KEY NOTES:

- Whether using Heads Up® alone or in combination with other seed treatments, always ensure that total liquid applied to the seed at time of treating is between 5-8 oz/cwt.
- Apply Heads Up® before or at the same time as applying other treatments.
- Heads Up® does not contain any living organisms and has a stable shelf life. When applied by itself, Heads Up® can be applied to the seed without any time restrictions to planting.

The following chart highlights recommended application rates by crop, diseases targeted and restrictions.

Remember — always read and follow label directions!

HEADS UP® RTA SEED TREATMENT

Application rates for 100-ounce solution of Heads Up® RTA Seed Treatment

Crop	Target Disease	Products Use Rate fl.oz./ CWT (100 lbs. of seed)	Remarks/Restrictions
Soybeans	Rhizoctonia Root Rot/Damping off (Rhizoctonia solani); White Mold (Sclerotinia sclerotiorum); Sudden Death Syndrome (Fusarium virguliforme)	0.5 oz.	Total volume of all liquid/all products being applied must achieve 5–8 fl. oz./100 lbs. of seed.
Soybeans	Pythium spp.	0.5 oz.–1.0 oz.	Total volume of all liquid/all products being applied must achieve 5–8 fl. oz./100 lbs. of seed. Under high Pythium spp. pressure use the high rate (1.0 fl. oz./100 lbs. of seed).
Dry Beans	Rhizoctonia Root Rot/Damping off (Rhizoctonia solani); White Mold (Sclerotinia sclerotiorum)	0.5 oz.	Total volume of all liquid/all products being applied must achieve 5–8 fl. oz./100 lbs. of seed.
Corn (includes field corn, sweet corn)	Common rust (Puccinia sorghi)	1.0 oz.	Total volume of all liquid/all products being applied must achieve 5–8 fl. oz./100 lbs. of seed.
Chickpeas	Seedling diseases caused by Fusarium and Rhizoctonia spp.	1.0 oz.	Total volume of all liquid/all products being applied must achieve 5–8 fl. oz./100 lbs. of seed.
Field Peas	Seedling diseases caused by Fusarium and Rhizoctonia spp.	0.5 oz.	Total volume of all liquid/all products being applied must achieve 5–8 fl. oz./100 lbs. of seed.
Wheat	Seedling diseases caused by Fusarium and Rhizoctonia spp.	0.5 oz.	Total volume of all liquid/all products being applied must achieve 5–8 fl. oz./100 lbs. of seed.
Potatoes (cut or whole tubers used for planting purposes)	Rhizoctonia Canker and Black Scurf (Rhizoctonia solani); Brown Spot (Altemaria alternata)	See remarks	See instructions below.

SITES

Potatoes

APPLICATION RATES

Seed Potatoes (as cut or whole tubers used for planting purposes)

100-ounce container of **Heads Up® RTA Seed Treatment** will treat 12,760–33,756 lbs. of seed.

Use rate is 0.2962 oz./100 lbs. to 0.783 oz./100 lbs.

APPLICATION

Seeds must be prepared and ready for seeding. The object is to achieve a wet shiny appearance to the seed. This will dry off or be absorbed by the seed; however, the treatment will remain in effect. Treat the seeds by dipping, spraying or dribbling the solution into a rotating auger conveyor or some other approved seed treatment device. Spray applications to seeds within an enclosed spray booth or other enclosed spray devices are also acceptable providing thorough coverage is achieved.

For seed potatoes, whether fresh cut or suberized, **Heads Up® RTA Seed Treatment must be applied to germinating seed potatoes**, as indicated by obvious sprouting activity coming from the potato eyes. This sprouting activity can be from peeking to full sprout length, but before green leaves appear.

Proper calibration and operation of application equipment is essential. Treat only the seed that you intend to plant and ensure all treated seed is used for planting purposes.

Recommended use: bulk up **Heads Up®** RTA Seed Treatment (through dilution with other products/water/additional liquid carrier at application) to achieve 0.5–1 gallon total volume of liquid per ton of seed to ensure adequate and complete coverage of seed (cut or whole tubers used for planting purposes).

heads up®
PLANT PROTECTANTS INC.

HEADS UP® IS AVAILABLE THROUGH MOST OF THE LEADING RETAILERS AND DISTRIBUTORS IN THE UNITED STATES

Need help finding where to buy Heads Up®? Interested in becoming a dealer?
Feel free to call us directly or visit us online.

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