Maryland Soybean Board

Soybean Sampler

FY21 RESEARCH REPORT

Working for Your Bottom Line

To ensure the U.S. soybean industry retains access to a quickly changing, consumer-driven market, five major trends were identified on how demand will change for the soy market and impact U.S. soybean farmers. Identifying these trends helps farmers navigate changes now so they can be prepared for the future of this industry. Opportunities for farmers can be found at www.futurestateofsoy.org. Proactively addressing how the market is shifting means US. farmers won't be left scrambling to meet market demands later, which will keep U.S. Soy in high demand around the world.

Your soy checkoff is already investing in programs at national and state levels to find new markets, new uses and new characteristics of soybeans that will align with these trends and result in strong returns for farmers. This work will help influence how the world perceives the value of domestic soy and soy products — growing demand around the world and your bottom line back on the farm.

Five trends for the future state of soy:

- A rising focus on high-quality soybean oil and meal.
- Changes in fuel demand, including alternative fuels and emerging fuel uses.
- The rising need for both animal and plant protein given a growing global population.
- The increasing global competition for soy and how infrastructure can provide an impactful advantage.
- Emerging and diversified revenue streams that will offer farmers more opportunities.

University of Maryland Soybean Variety Trials – Check Varieties

✓*University of Maryland, $11,391, Nicole Fiorellino, nfiorell@umd.edu*

Maryland producers need an unbiased comparison of soybean variety performance across the geographic and climatic regions of Maryland. This data can aid producers in soybean variety selection with the global goal of increasing producer profitability through increased yields.

The University of Maryland Soybean Variety trials have been completed for the 2021 growing season. The Trials Center team, who performs the work, wrapped up harvest by mid-November this year and the report was compiled and published online the end of November – significantly earlier than has been typical in the last few years.

In the soybean variety trials results document, data is presented separately by location of the trials and maturity group. Low yields and a lack of yield differences were observed across all maturity groups at the Clarksville location due to poor seed to soil contact at planting, where excessive fodder remained on the soil surface.

The selection of a variety based solely on performance at one location is not recommended. It is better to select variety based upon performance over a number of locations and years, if possible. To compare the performance of each variety across the test locations, relative yield was included in the report. Relative yield is the ratio of the yield of a variety at a location to the mean yield of all the varieties at that location expressed in percentage. A variety that has a relative yield consistently greater than 100 across all testing locations is considered to have excellent stability.

Of the MG 3 soybeans, two varieties in the full season test and six varieties in the double crop test had relative yield >100 at all locations in 2021. Two early MG 4 varieties in the full season test and seven varieties in the double crop test had relative yield >100 at all locations, while of the late MG 4 varieties, six varieties in the full season test and ten varieties in the double crop test met this standard. Finally, of the MG 5 varieties, three varieties each in the full season and double crop tests met this standard.

Explore variety trial results at:

MARYLAND.MEDIUS.RE

Evaluation of Growth-Promoting Products for Soybean Production in Maryland

✓*University of Maryland Extension, $4,795, Andrew Kness, akness@umd.edu*

Soybean farmers have had many new products come on the market in recent years touted as growth- promoting products intended to help growers attain high-yielding soybeans. Many of these products contain growth regulators, hormones, humic acids, carbon, sugars, and/or fertilizer. This project looks at one of these products, Take Off ST, to determine any agronomic benefits of the product against non-treated seed.

Field trials were established at Western Maryland Research & Education Center in Keedysville (WMREC) and Wye Research and Education Center in Queenstown (WYE). Experimental design consisted of soybeans planted at three different planting dates (primary factor) with plots split by Take Off ST treated seeds and nontreated seeds.

Take Off ST did not provide improved emergence in the 2021 trials and actually suppressed germination at the WYE middle plating location. However, it should be noted that the planting dates for the WYE location were later than those at WMREC, which could have contributed to this observation. In the previous two years of study, emergence of early planted soybeans was increased with Take Off ST. Even when relative emergence data was calculated and combined across locations there were no significant differences. This contrasts with what was observed in 2019 and 2020, where trials planted earlier in the year had significantly better emergence with Take Off ST. This may be explained by weather conditions; 2019 and 2020 was cooler and wetter at the early planted locations, especially during the month of April compared to 2021 where excellent planting conditions were experienced at both locations. Data from these three years suggest that Take Off ST may help soybeans emerge in soils that are cooler and wetter, but may have little benefit for later planted soybeans. This effect may be attributed to the prothioconazole, a fungicide seed treatment that prevents preemergence damping off caused by many soilborne pathogens that are common in cool, wet soils.

Yields were slightly above average at WMREC and slightly below average at WYE; this difference is likely explained by planting dates. The WMREC plots were seeded approximately one month earlier than the WYE plots.

Individual plot yields varied more at WMREC than at WYE, which could be explained by significant groundhog pressure at WMREC. As a result, extreme outliers in the dataset for WMREC were excluded in the data analysis. The only statistically significant difference in yield was observed at WMREC, where Take Off ST treated seed yielded significantly more than the non-treated seed for the middle planting date. All other pairwise comparisons within planting date × location were the same.

In order to eliminate location as a variable in our combined data analysis, relative yield was calculated. When treated seed was compared to non-treated seed in this fashion, Take Off ST treated seed yielded significantly better than non-treated seed for early and middle plantings. This data coincides with previous observations of improved plant emergence at earlier planting dates. None the treatments affected grain moisture or test weight.

Salt Tolerance in Soybean

✓*University of Maryland Eastern Shore, $19,363, Naveen Kumar and Kiran Dixit, fnaveenkumar@umes.edu*

Recent data showed higher salt levels in the coastal area of the Delmarva Peninsula ranges from 1.3 to 4.5 ppt (parts per trillion). This range of salt concentration can inhibit the growth of row crops and perpetuate salt tolerant invasive plants. Soybeans cannot tolerate more than 3 ppt of salt concentration. Seawater represents 35 ppt of salt concentration; this concentration may be higher in inlands ditches. Due to continuous rise in sea level, soil salinity will be a serious threat for the cultivation of soybeans on the Delmarva Peninsula. Soybeans are moderately tolerant to salinity with a threshold of 5 dS/m (approximately 50 mM NaCl). However, salt sensitive cultivars failed to produce seeds at 8 dS/m (approximately 80 mM NaCl; Liu et al., 2016). Salinity imparts negative effects on plant growth and development by manipulation of osmotic and ionic stresses. To prevent soil degradation from salinity, salt tolerant crops are required.

In the current work, three varieties (V1: Patent pending, V2: P46A16R, and V3: P48A94PR) of soybeans were screened for salt tolerance in potted experiments. Varietal differences were observed in salt tolerance. The variety V1 showed higher yield in salt stress regimes in comparison to V2 and V3. In addition, V1 showed higher leaf fresh weight, root fresh weight, leaf dry weight, root dry weight, nodule per plant, and seed yield per plant in comparison to V2 and V3 in salt stress regimes. Similarly, higher levels of proline were detected in V1 leaves. In addition, V1 showed an improved antioxidant defense system in terms of higher activities of superoxide dismutase (SOD) and peroxidase (POD) with concomitant decrease in hydrogen peroxide levels under salt stress. V1 can be a good candidate for salt affected soils. However, these results were the outcome of a greenhouse study and require testing in field conditions.

Strategies for Controlling Herbicide Resistant Common Ragweed in Maryland

✓*University of Maryland, $13,245, Sarah Hirsh and Kurt Vollmer, shirsh@umd.edu*

Field research was completed at the study site in Snow Hill to assess common ragweed control in response to cover crop, preplant herbicide application, and residual herbicides at planting. Soybeans were planted May 4. Ragweed counts and height measurements were assessed from April 13 through July 12, every 1-2 weeks. On April 13, there was less ragweed where a cover crop was present than no cover crop. On May 10, following preplant herbicide, there was more ragweed where no cover crop and no preplant herbicide was applied, as compared to where preplant herbicide was applied or where there was a cover crop with no preplant herbicide applied. On May 24 and July 7, there was less ragweed where a residual herbicide had been applied than no residual herbicide.

In addition, field research was completed at the supplemental study site in a conventionally tilled field in Snow Hill to assess the effects of preplant herbicide application and at-planting residual herbicide. There was less common ragweed 27 days after planting following a burndown + residual herbicide than following just a burndown herbicide or no burndown herbicide. In conclusion, ragweed primarily emerged in May; however, later emerging ragweed was noticed. Delaying cover crop burndown ("planting green") plus herbicide application at planting that included residuals provided good control of ragweed. There was no advantage of applying preplant + at planting herbicide, when at-planting herbicide included residuals. Following tillage, applying burndown + residual herbicide at planting resulted in less ragweed one month after planting than applying herbicide without residual or no herbicide.

Additional studies were established in the previously mentioned conventionally tilled site in Snow Hill to assess control of larger common ragweed. Initial herbicide treatments were applied when common ragweed plants reached 6-12" tall. Sequential applications were made 15 days later. Common ragweed in plots not previously treated had reached 14-18" at the time of the second herbicide application. Common ragweed control was evaluated every 1-2 weeks after application until July 12. Results indicate that tank mixing or sequential applications are needed when ragweed is sprayed at 6-12" tall. However, control was less when ragweed was 14-18", even with tank mixes.

Ragweed primarily emerges in May; however, later emerging ragweed has been noticed. Delaying cover crop burdown ("planting green") plus herbicide application at planting that includes residuals provides good control of ragweed. There is no advantage of applying preplant plus at planting herbicide, when at planting herbicide includes residuals. Following tillage, treatment that used burndown plus residual herbicide at planting resulted in less ragweed one month after planting than herbicide without residual or no herbicide. Research continues to support the need to apply postemergence herbicides at the label recommended weed sizes to obtain optimal control. At times when that may not be possible due to weather and other issues, it is important to use multiple, effective herbicide groups in tank mixtures or as sequential applications. Our research showed that at least 90% control was achieved on common ragweed ranging from 6 to 12 inches tall when effective postemergence herbicides such as 2,4-D or glufosinate were applied sequentially or as a single, tank-mix application. However, control with tank-mix applications declined when applied to common ragweed over 14 inches tall.

Phosphorus Runoff from No-till Soils - Do Cover Crops Make It Better or Worse?

✓*University of Maryland Environmental Science and Technology, $17,337, Ray Weil, rweil@umd.edu*

The main pathway for phosphorus (P) transport from croplands to bodies of water is via surface runoff during intense rainstorms or heavy snow melt. This project investigates how a range of cover crop practices impact the loss of phosphorus by surface runoff, analyzing the actual runoff volume and P concentration from single species or multi-species cover crops grow in no-till soils typical of Maryland soybean production.

In the fall of 2021 and winter of 2022, 24 erosion wears were deployed to collect runoff and sediment from plots with no cover crop, a rye cover crop, or a three-way cover crop mixture of radish - crimson clover - rye. By spring the latter treatment was primarily crimson clover with some rye mixed in as temperatures were cold enough during the winter to completely kill the radish. Since the radish cycles more phosphorus than the other two species, this provided a good opportunity to look for a flush of phosphorus expected after the radish winter kills.

Runoff from multiple rain events was collected prior to removing the runoff weirs from the field to allow planting the corn and soybeans in the plots. The sediment load was determined by filtering the runoff through a 0.45-micron filter. Dissolved phosphorus in filtered runoff samples from one event in October was analyzed. The presence of either rye or the radish-rye-cover cover crop appears to have had no significant effect on the concentration of P in the runoff.

The full set of filtered samples are under analysis in the lab for their nitrogen and phosphorus concentrations. This work will continue into the summer before data be summarized.

Evaluating Drone for Cover Crop Seeding and Pesticide Applications

✓*University of Maryland, $3,474, Andrew Kness and Erika Crowl, akness@umd.edu*

A cover crop of radish was flown on to a 28-acre standing corn field in Baltimore County on August 30, 2021 at the rate of 12.5 pounds of pure live seed per acre using a DJI drone equipped with a spin spreader capable of carrying 16 pounds of seed. The field was an excellent candidate for this trial because of its irregular shape, rolling terrain, and close proximity to wood lines. Corn grain was harvested and cover crop establishment was measured by counting the number of radish plants per square foot in a one square foot area at 20 random locations across the field. The average cover crop plant population in the field was 1.95 plants/ft^2, with a minimum of 0 and maximum of 4. Radish plants averaged 4 inches in height at the time of rating.

Canopy density was calculated using the Canopeo© application for smartphones (www.canopeoapp.com). Images were captured at 20 random locations across the field at a height of 2.5 feet above the ground and percentage green canopy was calculated by the Canopeo© software. Average canopy coverage was 30%.

In comparison to 2020, a decrease of establishment and canopy coverage was observed. Aerial establishment of cover crops is heavily influenced by soil moisture availability. During the period of August through November, a total of 10 more inches of rain fell in 2020 than 2021, which likely contributed to the differences observed in establishment between the two years. A second contributing factor may have been corn hybrid plant characteristics. From the aerial images of the field there is a noticeable pattern of greener, thicker cover crop growth next to thinner growth occurring roughly every 12 rows. This field

DJI drone equipped with hopper and spin spreader.

was planted with two different corn hybrids, one in each half of the planter and one of the hybrids was considerably taller. Better establishment was observed in the shorter hybrid where more seed likely hit the soil, along with more sunlight.

Data shows the potential for aerial seeding a radish cover crop with drones may be an effective method for establishing cover crops in these challenging fields. Future work will replicate and gather additional data so that the feasibility of seeding cover crops with drones can be fully understood.

Planting Green-Extending the Growing Season to Get More Payback from Cover Crops

✓*University of Maryland Environmental Science and Technology, $21,130, Ray Weil, rweil@umd.edu*

This project aims to improve soil quality, reduce crop stress, enhance nutrient cycling, and profitability through improved cover crop use. Compared to corn, soybeans tend to leave a large amount of soluble nitrogen (N) in the profile at the end of the season and tend to be harvested later. These factors make early cover crop establishment in fall especially important for soybean systems. Additionally, soybeans do not tend to respond adversely to the early shading and N immobilization that may be associated with planting into living high-biomass cover crops after extended growth in spring. Soybeans, therefore, stand to benefit from water conservation, nutrient-cycling, and compaction alleviation effects of high springtime biomass cover crops.

Results so far have shown that establishing cover crops early by interseeding into standing crops is practical using a highboy broadcast air-seeder, which offers flexibility with timing, especially for corn. Good cover crop stands were established when the seed was broadcast anytime between tasseling and the beginning of grain fill in corn canopies. When conditions were dry, early planting increased the likelihood of a seed-germinating rain occurring before corn senescence, thus giving the cover crop a good start. In soybeans, broadcasting cover crop seeds too early resulted in seeds germinating in a dark environment and the seedlings soon died. Broadcasting into a soybean canopy was effective when it was done at the beginning of leaf fall rather than leaf yellowing. During the summer of 2021, sensors showed that the heavier surface residue from the cover crops served to conserve moisture in the upper foot of soil. Because there was relatively good moisture throughout the season, this advantage did not translate into significantly higher yields of either corn or soybeans, which would likely occur in drier years.

In the spring of 2021, a significant slug infestation was observed in the fine-textured, wetter field. Research was expanded to study the impact of cover crops and cover crop termination date on slug damage to soybeans and corn seedlings. The spring of 2021 was unusually cool so the soybeans, in particular, got off to a slow start. Slug numbers were not affected by the cover crop but seemed to be affected by the type of residue on the surface. The slug damage to soybean seedlings was significantly less severe where the cover crop was terminated more than a week after the soybeans were planted. It is believed that this effect is likely to be even more pronounced in a warmer spring when soybeans can get off to a faster start. The project will continue to study the interaction between cover crop management and the degree of damage caused by slugs.

Soybean Fungicide Efficacy, Profitability, and Pest Resistance Over Time

✓*University of Maryland Extension, $13,098, Andrew Kness, akness@umd.edu*

Fungicides are becoming increasingly popular in full season soybean production. This research program provides data on fungicide efficacy for managing common fungal diseases of soybean, monitoring fungicide resistant pest populations, and tracking the economic impact of foliar fungicide applications over multiple years and environments unique to Maryland.

Field trials were established at the Western Maryland Research & Education Center in Keedysville (WMREC) and Wye Research and Education Center in Queenstown (WYE). Fungicides were applied at the R3 growth stage calibrated to deliver 20 GPA at 35 psi to the center 80 inches of each plot. Treatments with R3+14 days applications were made.

Growing conditions were generally very favorable and no ratable fungal diseases were observed at either trial location. This is likely due to the weather conditions around pod fill, as well as the resistance package in the soybean variety; Mid-Atlantic Seed 3720 E3/STS has a frogeye leafspot resistance rating of 8 on a 10-point scale (10 being the most resistant).

At the WMREC trial location, soybeans were identified that were infected with stem canker (Diaporthe spp.). Stem canker is a stem/root disease that causes premature plant death and may also infect developing seeds, affecting seed quality. Plots treated with foliar fungicides increased seed quality compared to the control, with Veltyma, and two applications of Revytek and Miravis Top, providing the best control of Diaporthe and improved seed quality.

All fungicide treatments, with the exception of Headline, significantly increased plant greenness as indicated by the NDVI ratings. Fungicides with the highest NDVI readings were Revytek, Miravis Top, and Veltyma. These results are consistent with other research in previous years and by others where fungicide applications generally induce a greening effect and cause the plants to retain their leaves for longer. However, this delayed senescence does not always correlate to a significant yield improvement.

Yields were slightly above average at WMREC and exceptional at WYE, with trial averages of 57.9 and 94.5 bushels per acre, respectively. Statistically, there were no significant differences at either location for grain moisture, test weight, or between fungicide treatments and the non-treated control.

Foliar fungicide applications with the selected products tested here provided some benefit on the 2021 growing season related to improved seed quality. Fungicides also significantly increased plant greenness and delayed senescence; however, none of the treatments yielded significantly different than the non- treated control. This is likely due to the fact that no ratable foliar fungal diseases were present in the plots this year. Without the presence of a pathogen, fungicides have reduced odds of improving yields over non-treated plots.

Fertilizing Cover Crops: Do You Have to Put Some In to Get More Out?

✓*University of Maryland Environmental Science and Technology, $21,344, Ray Weil and James Lewis, rweil@umd.edu*

Research was conducted to assess if a small nitrogen (N) application in the fall would increase cover crop benefits in winter and spring, and if it was justified to develop an in-field nitrate-test determining where nitrogen fertilization of cover crops would be beneficial.

At two sites on contrasting soils, leaching of nitrogen using suction lysimeters was monitored throughout the winter and into spring. Samples from the lace emitters were analyzed for nitrogen and phosphorus . Cover crop biomass was sampled and measured in late November and early December of 2021 to document the fall nitrogen uptake.

Because of observed salt injury to some cover crop foliage and the added complexity of testing three N rates, treatments were simplified in the second year to just two: No N applied versus 20 kg N/ha applied as a solution of ammonium nitrate. Smaller plots were used, with more replications. A total of 22 replications and 44 plots on the research station's sandy soils was conducted, and five commercial fields were used where a cover crop was flown on in August into standing corn.

The fall 2021 cover crop biomass response to applied N was significant in only one of the five commercial crop fields on the Eastern Shore in which N application micro plots were established. At one site there was a significant negative response to applied N which is under investigation.

The next step will be to extract and analyze the nitrate-N from the soil samples taken at each of the micro-plot pairs to determine if soil nitrate levels show a threshold that predicts when a positive response will be likely to N application on cover crops in fall. Tissue N content will be analyzed to determine if the additional N uptake at any sites exceeded the amount of N applied.

Evaluating Soybean Variety Performance and Response to Deer Grazing

✓*University of Maryland Extension, $8,258, Luke Macauley, James Lewis, and Nicole Fiorellino, lukemac@umd.edu*

This study sought to better understand deer herbivory of forage soybeans to develop strategies to reduce deer damage on soybean crops.

A more detailed understanding of the patterns of deer grazing on soybeans and how these patterns are influenced by precipitation was developed, as well as better insights into yields that can be expected from three different forage soybean varieties and how they compared to two conventional soybean varieties. Yield results found that the group 4.7 forage soybeans (GT1 Brier Ridge) and the conventional group 5.3 soybeans (Pioneer), provided the highest yields, with the lowest yield from the group 7 forage soybeans by Eagle Seed. Although the Big Fellow forage soybeans yielded the lowest amounts, they did appear to attract deer most in August, which may have helped alleviate deer grazing pressure during the R4-6 stages of development on conventional soybeans.

In terms of deer grazing patterns, it was documented that 74% of grazing activity occurred at night, with 44% of all grazing activity occurring in just five days of June and July. Statistical analysis of precipitation patterns found that grazing was significantly affected by rainfall events, with decreased grazing activity during rainfall events, increasing grazing activity one day following rainfall, and even greater grazing activity the second day after rain.

Some anecdotal evidence showed deer preferring later maturing forage soybeans later in the season, which may provide relief to conventional soybeans during the full pod, beginning seed, and full seed stages (R4, R5, and R6) of development. A buffer of forage soybeans planted around an irrigated cornfield appeared to have corn yield benefits, and was considered well worth the investment and loss of yield from the buffer strip itself.

Much was learned in the first year, however, the highly variable nature of both deer grazing and deer populations limited the ability to answer the objectives. Deer grazing intensity at the Wye Research and Education Center was not as high as expected in 2021, possibly due to a die-off of deer from Epizootic Hemorrhagic Disease in 2020. This led to only moderate levels of deer damage, which produced counterintuitive results, such as decreased plant biomass in plots protected from grazing, and non-significant effects of deer grazing on soybean yields.

Evaluating Earlier Planting Dates for Increased Soybean Yields

✓*University of Maryland, $9,767. Nicole Fiorellino and Andrew Kness, nfiorell@umd.edu*

Full season soybeans were planted at three different dates to compare tissue and soil samples to yield after harvest, evaluating soybeans for nutrient deficiencies, disorders, or pest pressure. A successful 2021 growing season enabled the project to be generally completed as proposed at the three locations of Wye, Clarksville, and Keedysville Research and Education Centers. Planting started at the Clarksville location first and not yet having the seed for the MG 3 soybean, the trial was established with early MG 4, late MG 4, and MG 5 soybean varieties only at this location. Both the Wye and Keedysville locations had all four varieties with three different planting dates (total of 12 treatments). Tissue and soil samples were collected as best as possible near R1-R2 growth stage for the late MG 4 variety only, except at locations where rainfall limited ability to properly collect a soil sample, i.e., soil too dry for collection. All plots were evaluated for disease throughout the season and yield was collected from each plot as proposed for 2021.

With only one year of yield data, major conclusions cannot yet be drawn. However in 2021, at Keedysville, there was a significant effect of maturity group on soybean yield where the early MG 4 and the MG 5 varieties outyielded the late MG 4 and performed similarly to the MG 3. Planting date did not impact yield at Keedysville or Clarksville in 2021. At Wye, there was an interaction between maturity group and planting date, whereby early planting did not increase yield appreciably, regardless of maturity group. With another year of data added to this dataset, more concrete conclusions can be drawn about the impact of planting date and maturity of soybean on yield. Additionally, information will be provided on the nutrient status of plant tissue and soils under different planting dates with additional years of data collection. The goal is to provide soybean farmers with updated recommendations on planting date for soybeans, namely across different maturity groups.

Efficacy of Herbicides, Timing, and Tank Mixes on Novel Herbicide Tolerant Traits in MD Soybean Systems

✓*University of Maryland Extension, $7,371, Benjamin Beale and Alan Leslie, bbeale@umd.edu*

Herbicide trials evaluating the efficacy of various combinations of post emergent contact and systemic herbicides was conducted during the 2021 growing season to evaluate control of Palmer amaranth. This is the second year of the research study. The selected site was part of an 8 acre field primarily with Sassafras soils with a heavy infestation of glyphosate and ALS resistant palmer amaranth the preceding crop year. A plot design consisting of both Enlist and Xtendflex soybean varieties was used to evaluate herbicide performance across an early and late treatment, with 17 treatment protocols evaluated.

Soybeans were planted on June 24 with Pioneer P45T88 Enlist E3 and Asgrow AG47XFO Xtendflex variety soybeans utilizing a complete randomized block split plot design. All plots received a burn down/residual treatment prior to soybean emergence. Treatment consisted of Dual Magnum at one pint per acre, Gramoxone SL 3.0 at two pints per acre and Roundup Powermax at one quart per acre. Plots were then split, with one half of the plots receiving an application of the post emergence treatments applied 22 days after burndown application (on-time or early treatment) and the other half of the plots receiving a postemergence application 46 days after initial burndown (non-timely or late treatment).

Palmer amaranth plants were emerged and present across all plots with an average height of 4 inches at the time of the on-time or early application. Palmer amaranth plants had an average height of 24-30 inches at the time of the late or non-timely application. Treatments were rated for percent control of Palmer amaranth at 23, 32 and 60 days after postemergence application.

Results indicate that most tank-mix combinations tested provided adequate control of emerged Palmer amaranth, with no apparent antagonism. The treatment of Select Max + Enlist One resulted in significantly less control at 22 days after treatment. As expected, treatments with Roundup, Select Max and the control treatments had little to no control of Palmer amaranth. Additionally, the treatments applied late did not perform as well as the early treatment.

This study confirms the importance of timely postemergence applications when Palmer amaranth weeds are still less than 4-6 inches in height.

A separate trial at the same location was conducted to evaluate herbicide treatment protocols for grass control. Stands of fall panicum and barnyard grass were present in the test plots. Herbicide performance was evaluated at three time intervals. The plot size was 5 feet wide by 10 feet long. Pioneer P45T88 Enlist E3 were planted on June 24. Postemergence treatments were applied to all plots on July 23. Barnyard grass and fall panicum were primary species present. Grass was an average height of 15-20 inches in height. Control percentage was rated from 0-100 on August 4 and August 9 with non-treated control plots and non-treated running checks along each plot being used as a reference point for 0% control.

Field Evaluation of Resistance Sources for Management of Soybean Cyst Nematode

✓*University of Delaware, $6,180, Alyssa Koehler, akoehler@udel.edu*

Soybean cyst nematode (SCN) (Heterodera glycines) consistently ranks as the most destructive pathogen of soybeans (Glycine max (L.) Merrill) across the United States. There may be several generations within a single growing season, and recalcitrant cysts and eggs can persist in the soil for long periods.

SCN has been present in Delaware since 1979 and Maryland since 1980. Nematodes often go undiagnosed and can be very damaging to soybean production, reducing both yield and quality. Growers have relied heavily on resistant varieties, primarily using the PI88788 resistance source. Long-term exposure to this resistance gene has selected for SCN populations that can overcome this source of resistance. As resistance from the PI88788 gene loses effectiveness, growers need additional tools to manage nematode populations.

In 2020, a field site was established at the Carvel Research and Education Center to conduct SCN related soybean research. Upon sample analysis, nematode populations in this field were found to have a 65% reproduction level on resistance source PI88788; this gene once kept reproduction well below 10%.

A five-replication field trial was conducted in 2021 to evaluate two additional resistance genes, Peking and PI89772, compared to lines with PI88788, for stand emergence, control of SCN, and yield differences. Soybean maturity group had the largest impact on yield, but the PI89772 resistance gene had the lowest numerical value of SCN at the end of the season and lowest nematode reproductive factor. Further replications of this experiment will be conducted in 2022 to gain additional data on performance of these resistance genes.

Current Checkoff Research Underway

The Maryland Soybean Board supports research for soybean farmers to have the most current information to protect their crops and the environment. Recent research investments have focused on yield and soil health.

For this 2022 growing season, 14 grants, totaling $195,754 in checkoff investment, were awarded by the farmer-led board to provide production research that applies specifically to Maryland soybean growers.

Research projects receiving 2022 funding:

University of Delaware

✓ Assessing the Efficacy of Foliar Fungicides Applied through Irrigation for Soybean Production, $6,310, *Alyssa Koehler and James Adkins*

✓ Continued Field Evaluation of Resistance Sources for Management of Soybean Cyst Nematode, $6,690, *Alyssa Koehler*

University of Maryland

✓ Developing an Interactive Web Tool Combining Integrated Pest Management Recommendations and Production Costs for Pesticide Selection, $8,782, *Alan Leslie*

✓ Effect of Planting Date on Seasonal Timing of Pest Complexes and Insecticide Efficacy, $19,548, *Kelly Hamby and Lasair ní Chochlain*

✓ Evaluating Deer Preferences for Soybean Varieties and Soybean Response to Deer Herbivory, $13,183, *Luke Macaulay, Nicole Fiorellino and James Lewis*

✓ Evaluating Earlier Planting Dates for Increased Soybean Yields, $22,407, *Nicole Fiorellino, Louis Thorne and Andrew Kness*

✓ Fertilizing Cover Crops: Do You Have to Put Some In to Get More Out?, $17,264, *Raymond Weil and James Lewis*

✓ Management of Herbicide Resistant Italian Ryegrass and Other Problem Weeds Prior to Soybean Planting, $11,723, *Dr. Kurt Vollmer and Alan Leslie*

✓ Pesticide Application and Cover Crop Seeding Using Drones, $9,556, *Andrew Kness and Erika Crowl*

✓ Phosphorus Runoff from No-till Soils—Do Cover Crops Make It Better or Worse?, $17,207, *Raymond Weil*

✓ Planting Green: Extending the Growing Season to Get More Payback from Cover Crops, $20,949, *Raymond Weil*

✓ Planting into Green Cover Crops to Reduce Deer Grazing of Soybean Seedlings, $12,073, *Luke Macaulay, Raymond Weil, Nicole Fiorellino and James Lewis*

✓ Soybean Fungicide Efficacy, Profitability, and Pest Resistance Over Time, $18,389, *Andrew Kness*

✓ University of Maryland Soybean Variety Trials – Check Varieties, $11,673, *Nicole Fiorellino and Louis Thorne*

SOYBEAN RESEARCH & INFORMATION NETWORK

SOYBEANRESEARCHINFO.COM

Want to know the latest on growth products?

Wonder what herbicides have shown results?

Check out the latest research funded by your soybean checkoff.

MSB MARYLAND SOYBEAN BOARD

Executive Director

Danielle Bauer Farace
443-812-4526
danielle@mdsoy.com

www.mdsoy.com

PO Box 319, Salisbury MD 21803