

CHECKOFF INVESTED FOR FISCAL YEAR 2024

The Kentucky Soybean Promotion Board (KSPB) met on National Agriculture Day, March 21, to conduct its regular business and to hear research proposals. Several opportunities for checkoff investments were proposed, and the Board invested in a number of projects in the areas of production research and new uses/utilization.

The Kentucky Soybean Board is composed of farmers appointed by the Kentucky Soybean Association (four appointees), Kentucky Farm Bureau (two appointees), and the Kentucky Department of Agriculture (one appointee). Kentucky farmers who serve on the United Soybean Board and the American Soybean Association Board are also seated on the Kentucky Soybean Board by virtue of their service at the national level.

“One of the most important things we do each year as a check-off board is to invest those dollars into projects that return results to the farmers,” said Kentucky Soybean Promotion Board chairman Larry Thomas. After conducting its regular meeting business, the Board funded the following research projects for Fiscal Year 2024, which runs from July 1, 2023, to June 30, 2024.

PRODUCTION RESEARCH

EVALUATION OF SOYBEAN CULTIVARS PERFORMANCE IN KY (VARIETY TRIALS)

UNIVERSITY OF KENTUCKY, BILL BRUENING/CAM KENIMER

While the Board has funded Variety Trials for a number of years with varying degrees of success, the changes that were made when Bill and Cam took over this project renewed farmer-leaders’ confidence in the results. Changes to the reporting format for 2022 made results much easier to read and compare, and the Board believes that this annual unbiased evaluation of variety performance is now on the right track to deliver agronomically sound information to the farmers. One important addition for the 2023 growing season is that of later-planted varieties in a double-crop situation.

BLUE WATER FARMS: EDGE-OF-FIELD MONITORING

UNIVERSITY OF KENTUCKY – DR. BRAD LEE

The objective of this project is to manage a network of 22 edge-of-field (EoF) water quality monitored watersheds on five soybean farming operations in western Kentucky, collectively known as Blue Water Farms. This is a long-term project which is currently in Year 7, and it is a cornerstone of the Board’s current research portfolio.

SOYBEAN CYST NEMATODE TESTING

DR. CARL BRADLEY, UNIVERSITY OF KENTUCKY

The Board voted to continue funding Free Soybean Cyst Nematode (SCN) testing for Kentucky farmers under the direction of Dr. Bradley. If interested in this program, please contact your local county extension agent.

DISTRIBUTION AND MANAGEMENT OF RED CROWN ROT

DR. CARL BRADLEY, UNIVERSITY OF KENTUCKY

Red crown rot, caused by the fungus *Colletotrichum illicicola*, was discovered for the first time in Kentucky in September 2021 in soybean fields in Graves County. Data indicated that yields were reduced by approximately 70 percent, and it is our goal



to help farmers prevent major economic losses to this disease, which could be as great as 70 percent if the disease was left unmanaged. This project is in Year Two of funding.

EVALUATING ROI OF DISEASE MANAGEMENT PRACTICES

DR. CARL BRADLEY, UNIVERSITY OF KENTUCKY

Diseases are one of the main yield-limiting factors of soybean production that farmers must contend with every year. In Kentucky, estimated annual losses due to diseases over the last 5 years have averaged over 7.9 million bushels of soybeans, which has an approximate value of over \$83 million. To protect against yield losses caused by diseases, soybean farmers often actively manage these diseases by utilizing inputs such as fungicide and nematicide seed treatments and foliar fungicides. This research project seeks to evaluate the return on investment (ROI) of different soybean disease management practices in Kentucky. This project fits the Kentucky Soybean Board’s research priority, “Reducing the cost of producing soybeans.” The results of our research will provide Kentucky soybean farmers with information that they can use to help determine which disease management practices are helping to increase ROI, and which disease management practices are not increasing ROI. This project is in Year

Two of funding.

STUDIES ON INCIDENCES AND MANAGEMENT OF SLUGS & SNAILS IN KENTUCKY

DR. RAUL VILLANUEVA, UNIVERSITY OF KENTUCKY

Despite the 2022 drought, mollusk outbreaks were reported in soybeans in Western Kentucky. High populations of snails reduced soybean stands forced growers to replant, this caused uneven crop and increase of production costs. Slug outbreaks have been increasing in commercial soybeans lately. In 2017, approx. 10% (150,000) of total KY-soybean acreage was replanted due to slug damage. In 2023, Dr. Villanueva will continue more in-depth studies on snail research. The objectives for 2023 are to: monitor for mollusk (snails and slugs) populations in soybean, identify the slug and snail species attacking commercial soybeans, test commercial molluscicide efficacy in laboratory and field environments, test potential alternatives of control, and to deliver and disseminate our results to end users.

INSECTICIDE TESTS & STRATEGIES AGAINST STINK BUGS

UNIVERSITY OF KENTUCKY, DR. RAUL VILLANUEVA

In the U.S., soybean farmers use pesticides and cultural practices to control pests. However, the occurrence of invasive species can threaten soybean production. The Brown Marmorated Stink Bug (BMSB) arrived recently to Western Kentucky, and its damage on soybeans is unknown as well as efficacies of insecticides. In KY farmers need to know their efficacies to control BMSB at low cost and reducing negative side-effects. Since 2016, Villanueva has been testing different pesticides to control stink bugs in the field, but the efficacy of insecticides against native stink bugs may not be equally effective on BMSB. This project will compare the use of stink bug traps baited with pheromones vs. sweep nets for management decisions, assess efficacies of conventional and novel insecticides, evaluate the status of insecticide applications by farmers in Kentucky, and transfer all information generated in this study to end users.



A DECISION TOOL TO IDENTIFY ECONOMICALLY OPTIMUM PLANTING DATES FOR KENTUCKY PRODUCERS

UNIVERSITY OF KENTUCKY, DR. MONTSE SALMERON

Planting date is the single management factor with the largest impact on soybean yield. Previous research has shown the benefits from planting as early as in March to increase yields under irrigated conditions in the U.S. Midsouth. However, the optimum planting window to maximize yield and economic returns for soybeans grown in Kentucky had not been quantified yet. Our irrigated field trial in 2022 revealed up to 27 bushel per acre yield gain when planting soybean in late April compared to planting in mid-May. Our yield simulations with a calibrated model support these findings, and indicate an additional yield gain when planting in early April under irrigation. However, our results show that the benefit from early planting is limited under rainfed conditions.

Water availability and soil type are major factors driving the yield variability from year to year, and affecting the soybean yield response to planting date. In addition, early planting dates can increase yield, but also increase the risk of low temperatures and the need to replant. Thus, our preliminary economic analysis indicates that soybean producers can benefit from early planting dates, but that the optimum planting window to increase net returns will be highly dependent on the location, soil type, and the ability to irrigate.

The overall goal of this research is to generate new knowledge on optimum planting date and irrigation recommendations that increase net returns and sustainability of soybean production in Kentucky. We also aim to translate our findings in form of an easy decision tool with economic analysis that can provide tailored recommendations. This project is in Year Two of funding.

EVALUATIONS OF THE ENLIST E3 AND ROUNDUP READY 2 XTENDFLEX SOYBEAN SYSTEMS USING TRADITIONAL HERBICIDE COMBINATIONS

UNIVERSITY OF KENTUCKY, DR. TRAVIS LEGLEITER

The Roundup Ready 2 XtendFlex (dicamba, glyphosate, and glufosinate-resistant) and Enlist E3 (2,4-D, glyphosate, and glufosinate-resistant) soybean systems have become the dominant herbicide resistant soybean platforms in Kentucky.

Both platforms have provided benefits to Kentucky soybean farmers with the recent increase in glyphosate and PPO-resistant broadleaves, especially the *Amaranthus* species. The heavy use of the systems and heavy reliance on the growth regulators (dicamba and 2,4-D) has created scenarios of potential resistance selection. In 2022 numerous complaints of reduced dicamba and 2,4-D efficacy were reported, although no resistance events have yet to be confirmed.

CHECKOFF INVESTED FOR FY 2024 (CONTINUED)

Additionally the recent implementation of forward moving reviews of all pesticides for ESA (Endangered Species Act) mitigations threatens the full utilization of all herbicides. In the face of both potential resistance and increased regulatory restrictions the evaluation of combinations of herbicides related to the soybean resistance traits (dicamba, 2,4-D, glyphosate, and glufosinate) and combinations of older chemistries such as group 1 (clethodim, quizalofop, etc) group 14 (fomesafen, lactofen, etc) and group 2 (cloransulam, imazethapyr, etc) is needed in both herbicide-resistant soybean platforms.

UTILIZATION RESEARCH



SOYBEAN ADHESIVES FOR HEMP-BASED PRODUCTS GREG WILSON, HEMPWOOD

This project seeks to improve the wet strength resistance of hemp-based flooring products through increases in soy flour/protein content and/or through the incorporation of soybean oil additives. The commercial HempWood boards are currently composed of 75-80% hemp, 15-20% soy flour,

and 5-10% adhesive, and are produced solely in Murray, Kentucky. The 2022 project was able to reduce the water swelling by 50%, but reports of delamination are still being received. Modified soy flour-based adhesives have been researched and need to now be implemented into factory production. Ultimately, this proposal will allow HempWood to improve current production of hemp-based wood panels while supporting the development of a recently established composite flooring line and expansion to other regions (PA, OR). This project is in Year Two of funding.

STRUCTURAL HEMPWOOD WITH SOY ADHESIVE GREG WILSON, HEMPWOOD

We plan to develop a hemp-soy composite structural lumber. We are currently researching several soy flour based adhesives on a lab scale with the intent to match the desired mechanical and engineering specifications for structural HempWood. More

specifically, we must improve the water resistance of our current program under more extreme conditions (ASTM methods 1037, D4761-19, D-7247) as well as improve the overall load bearing of the material. To break into this market, additional research and testing is needed on this brand-new soy/hemp composite in order to access a market opportunity that is 20-times that of the current flooring products. To achieve this new product, soy flour and/or soy oil derivatives will be formulated with commercial polyurethane, polyacrylic or epoxy pre-polymer resins in order to create thermoset with enhanced mechanical properties and water resistance.

SOYHULL BASED ACTIVATED CARBON FOR CRUDE GLYCERINE DR. JAGANNADH SATYAVOLU, BIOPRODUCTS LLC

Replacing a coal-derived activated carbon (AC) with the low cost and sustainable soy hull-derived AC for the production of refined glycerin from crude glycerin is the strategic goal of this proposal. The AC for this application needs to be of high purity with very low leachable metal ions.

Past work at University of Louisville (UofL) demonstrated that such pure and high surface area AC is consistently produced when integrating the AC as a co-product of xylose production from soy hulls. The work showed that hemicellulose removed soy hulls are highly effective and are uniquely suited to produce high surface area carbons for composites, environmental, as well as energy storage applications. Additionally, as the high surface area activated carbon (AC) is a large market – an integrated opportunity comprising of xylose, AC, and the modified soy fiber NFC can absorb large volumes of soy hulls.

Such an approach is expected to increase consumption and demand for soy hulls. The amount of soy hulls in the U.S. is about 8 million tons per year. For soybean processors, one of the limited outlets for soy hulls is feed markets. However, there is intense competition in feed markets from the corn milling and ethanol industry. Hence soybean processors are looking for additional value-added opportunities for soy hulls.

Using past funding from Kentucky Soybean Board, we produced soyhull derived AC and compared its performance to that of coal-derived AC in crude glycerin clarification. While the clarification performance was comparable between the two activated carbons, the soy hull derived AC showed slow drainage due to its fine powder form. In this proposed work, a pelletized form of soyhull derived AC will be produced and its performance in crude glycerin clarification as well as in drainage will be evaluated.

KENTUCKY INVESTS IN AIRABLE RESEARCH LAB

As new uses – or utilization research – has become more of a priority over the years, the farmer-leaders who invest Kentucky’s share of the soybean checkoff have sought ways to invest in research that seeks to incorporate soy/soy components into existing or new products that will actually reach the marketplace.

These farmers are excited about Kentucky’s Soy Innovation Challenge, which engages students in the activity of coming up with ways to include soy in new or innovative ways, and we plan for that program to continue. But pushing the envelope on soy inclusion and not only figuring out how to incorporate soy components into industrial applications, plus having the contacts and understanding the processes to actually bring those products to the marketplace isn’t in our wheelhouse. Filing patents and licensing new products is a very specialized skill set, and certainly justifies full-time jobs for a team of innovators.

Combine those big expectations with Kentucky’s modest budget and small staff, and most folks would feel defeated. But, thanks to Executive Director Debbie Ellis (who is constantly seeking avenues by which Kentucky farmers can leverage their soy checkoff dollars for maximum return on investment), and our United Soybean Board Directors, the Kentucky Soybean Promotion Board knows about Airable Research Lab.

Airable Research Lab is the research and development arm of the Ohio Soybean Council. Under the direction of Barry McGraw, the lab works with companies to not only create new soy-based products but also to improve existing products by using soy. The

Lab leverages decades of experience and knowledge in the soybean industry to create innovative and sustainable solutions to research and product development through bio-based chemistry.

The Council helped to develop RoofMaxx through the Airable Lab, and the DEWALT Bar and Chain Oil that you saw in the Summer 2022 Sentinel is a result of Airable’s partnership with Black & Decker to create the first bar and chain oil in North America that is USDA Certified and biodegradable.

The Lab, as mentioned previously, is under the direction of Barry McGraw, who is listed as Founder and CLO. Prior to the launch of Airable in 2019, McGraw was the Director of Product Development and Commercialization for the Ohio Soybean Council for more than nine years, and before that he spent nearly 15 years working at Battelle, a well-known think tank that provides comprehensive scientific solutions to companies and government agencies.

With the decision to invest in Airable Labs, Kentucky joins not only the Ohio Soybean Council, but also the Iowa Soybean Association, Illinois Soybean Association, Missouri Soybeans, and the Michigan Soybean Committee in partnering to invest checkoff dollars into real-world applications that are commercializable.

Kentucky Soybean Board farmer-leader Barry Alexander, who farms in Cadiz and also serves on the United Soybean Board, said, “The new uses and utilization category is where I think we need to be investing more checkoff dollars, so I was glad to see this opportunity come along. Production research is fine, and needed, but most of the farmers I know are already pretty good at growing soybeans. Finding more uses for soybeans and their components is one of my top priorities as a decision-maker for Kentucky’s checkoff funds,” Alexander said.

“We need to do all that we can to expand the market for our crop, and the people here at Airable Labs know how to do that. Our farmers and staff members don’t have the skillset nor the time to develop new uses and then work on the patenting and licensing – that’s what Airable does, and I think finding a well-established lab that is already soy-focused is the best thing we could do to get maximum return on our checkoff investment,” he continued. “I am excited to see what they come up with next. RoofMaxx, Okabashi flip-flops, and the new DEWALT Bar and Chain Oil are already success stories, and there’s no reason to think that more new and exciting uses for soybean components aren’t on the horizon.”



**AIRABLE LABS
CHIEF LABORATORY OFFICER
BARRY MCGRAW**