

United States Agricultural Biologicals Market By Product Type (Microbials, Macrobiotics, Semiochemicals, Natural Products), By Mode of Application (Foliar Spray, Soil Treatment, Seed Treatment, Others), By Region, Competition, Forecast & Opportunities, 2019-2029F

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Abstracts

United States Agricultural Biologicals Market was valued at USD 2.43 Billion in 2023 and is anticipated to project steady growth to reach USD 3.17 Billion in 2029 with a CAGR through 4.56%. Agricultural biologicals, alternatively known as biopesticides or biofertilizers, encompass a diverse range of products derived from natural sources such as microorganisms, plant extracts, beneficial insects, and organic matter. These innovative solutions are integral to modern farming practices, serving to enhance productivity, manage pests, bolster crop health, and enrich nutritional content.

The projected growth trajectory of the agricultural biologicals market can be attributed to several key drivers. Firstly, there is a burgeoning interest in organic farming methods, which heavily rely on agricultural biologicals for effective pest management and soil enrichment. As consumer demand for organic produce continues to escalate, farmers are increasingly turning to these biological solutions to align with evolving market preferences.

Also, the sector has witnessed a substantial surge in research and development (R&D) endeavors. Companies are funneling significant resources into R&D initiatives, striving to pioneer innovative and highly efficacious biological solutions. A noteworthy exemplar of this trend is Bioworks Inc., a prominent market player, which consistently demonstrates its dedication to advancing the field through robust research and

development undertakings.

Regulatory agencies and environmental organizations are actively promoting the adoption of agricultural biologicals due to their environmentally benign attributes. Unlike traditional agrochemicals, biologicals are biodegradable and non-toxic, rendering them safe for both ecological ecosystems and human health. This intrinsic eco-friendliness resonates with the global thrust towards sustainable agricultural practices, further propelling the demand for agricultural biologicals.

Despite the promising prospects, the market encounters notable challenges. A significant hurdle is the comparatively elevated cost of agricultural biologicals vis-à-vis conventional agrochemicals. Additionally, some farmers may harbor reservations or skepticism regarding the efficacy of these products. Nevertheless, through continuous educational outreach and compelling demonstrations showcasing the myriad benefits of agricultural biologicals, these barriers can be surmounted, paving the path for broader adoption and market expansion.

Key Market Drivers

Growing Demand for Organic Products

The United States Agricultural Biologicals Market is experiencing remarkable growth, fueled by the surging demand for organic products nationwide. This escalating trend reflects a broader consumer shift towards healthier, environmentally friendly food choices. With increasing awareness about the health and environmental benefits of organic produce, consumers are actively seeking out organic options, driving a corresponding need for agricultural biologicals. These natural and sustainable solutions, including biopesticides, biofertilizers, and other organic inputs, are pivotal in supporting organic farming practices, enabling farmers to cultivate crops without synthetic chemicals or genetically modified organisms.

The area of certified organic land in the U.S. dedicated to crop and livestock production expanded from 1.8 million acres in 2000 to 4.9 million acres by 2021. Despite organic farmland comprising less than 1% of total U.S. agricultural land, organic sales represented approximately 3% of farm revenues in 2021. Currently, more regions are cultivating organic products, an increasing number of retailers are offering organic food, and greater research and development (R&D) funding is being allocated to the advancement of organic agriculture.

Moreover, government regulations and certification standards play a significant role in driving the growth of the organic market. The United States Department of Agriculture (USDA) regulates the organic certification process, ensuring that organic products adhere to strict criteria for production and labeling. This regulatory framework instills consumer confidence and incentivizes farmers to embrace organic practices, thereby driving the demand for agricultural biologicals as essential inputs for organic farming.

Advancements in agricultural technology and ongoing research efforts are contributing to the expansion of the agricultural biologicals market. Continued innovation is focused on developing new and improved biological solutions that offer enhanced efficacy, sustainability, and compatibility with organic farming principles. Companies are investing in research and development to bring innovative biological products to market, catering to the evolving needs of organic farmers and further propelling market growth.

The burgeoning demand for organic products is a key driver behind the growth of the United States Agricultural Biologicals Market. As consumers increasingly prioritize health, sustainability, and environmental stewardship, the demand for organic produce continues to rise, fueling the adoption of agricultural biologicals as indispensable tools for organic farming. With ongoing innovation and regulatory support, the agricultural biologicals market is poised for sustained growth, reflecting the growing importance of organic agriculture in the broader agricultural landscape.

Surge in Technological Advancements

Advancements in technology have significantly impacted the agricultural sector, particularly in the area of agricultural biologicals. These innovative products, including biopesticides, biostimulants, and biofertilizers, derived from natural materials, have undergone a remarkable transformation due to technological advancements.

Research and development (R&D) in agricultural biologicals has been propelled by modern technologies such as genetic engineering and nanotechnology. These cutting-edge tools enable scientists to precisely manipulate organisms at the molecular level, leading to the creation of more effective and targeted biologicals. The ability to modify genetic traits in crops and microorganisms has opened up new avenues for enhancing disease resistance, nutrient uptake, and overall crop productivity. Another advancement in data analysis and artificial intelligence (AI) have revolutionized the application of agricultural biologicals. Farmers now have access to precision agriculture technologies that enable them to optimize the use of biologicals. By leveraging data-driven insights and AI algorithms, farmers can determine the right number of biologicals

to apply, at the right time and in the right locations. This precision leads to improved effectiveness, reduced waste, and ultimately, enhanced sustainability in agricultural practices. At the forefront of this agricultural transformation is Farmonaut, a company harnessing cutting-edge technology to make precision farming both accessible and cost-effective. Although Farmonaut does not produce agricultural biologicals directly, its sophisticated satellite-based farm management solutions play a key role in optimizing their application. By integrating satellite imagery, artificial intelligence, and machine learning, Farmonaut's platform delivers real-time insights on crop health, soil conditions, and pest pressures to farmers. This data-driven strategy ensures more accurate and efficient use of agricultural biologicals, enhancing their effectiveness while reducing waste.

Technological advancements have also led to significant improvements in the production and distribution processes of agricultural biologicals. For example, advanced bioreactors are now utilized for mass production of microorganisms used in biologicals. These bioreactors provide controlled environments that ensure consistent and high-quality production of beneficial microorganisms. Digital platforms have emerged, facilitating easier access for farmers to discover and acquire agricultural biological products. These platforms provide comprehensive information, including product details, usage guidelines, and reviews, enabling farmers to make informed decisions.

The continuous advancements in technology are expected to drive further growth in the U.S. Agricultural Biologicals Market. As more innovative and effective products are developed, and as precision agriculture becomes more widespread, the demand for agricultural biologicals is likely to increase. These technological advancements not only offer economic opportunities but also contribute to sustainable agricultural practices, reducing the reliance on synthetic chemicals and promoting environmental stewardship.

However, to fully leverage these advancements, there is a need for continued investment in R&D and infrastructure. Ongoing research will fuel the development of new generations of agricultural biologicals with enhanced functionalities and improved performance. Likewise, educational initiatives should be undertaken to ensure farmers are well-informed about these new technologies and products. Training programs and workshops can help bridge the knowledge gap and facilitate the effective adoption of agricultural biologicals. The surge in technological advancements is a significant driver of the United States Agricultural Biologicals Market. As technology continues to evolve and revolutionize the agricultural sector, the market for agricultural biologicals is set to experience substantial growth. The integration of advanced technologies in agricultural practices holds great promise for increased productivity, sustainability, and resilience in

the face of future challenges.

Key Market Challenges

Limited Range of Available Products

Agricultural biologicals, encompassing biopesticides, bio stimulants, and biofertilizers, derive from natural sources like microorganisms, plant extracts, and beneficial insects. These innovative products offer a sustainable and environmentally friendly alternative to conventional farming techniques. By improving crop health, boosting yields, and minimizing environmental impact, agricultural biologicals contribute to a more sustainable agricultural model.

However, despite their numerous advantages, the current range of agricultural biologicals in the market remains somewhat limited. While there are effective products for addressing certain common pests and diseases, many other agricultural challenges lack suitable biological solutions. This limitation impedes widespread adoption among farmers, who often resort to traditional agrochemicals to tackle specific pest and disease issues.

The restricted product range not only affects the adoption of agricultural biologicals but also influences their perceived efficacy. When farmers cannot find suitable biological products to address all their farming needs, doubts may arise regarding their overall effectiveness. This skepticism can undermine trust and confidence in these sustainable solutions. The narrow product range presents a barrier to the growth potential of the U.S. Agricultural Biologicals Market. Without a broader array of products, the market cannot fully cater to the diverse needs of the agricultural sector, hindering its ability to meet the increasing demand for sustainable farming practices.

To address these challenges and unlock the full potential of agricultural biologicals, further research and development, as well as collaboration among industry stakeholders, are necessary. By expanding the range of available products and addressing farmers' specific needs, the agricultural sector can fully embrace the benefits of biologicals and pave the way for a more sustainable future.

Key Market Trends

Integration of Biologicals with Conventional Methods

In developed markets such as the United States, agricultural biological products, including biopesticides, biostimulants, and biofertilizers, have become integral components of integrated pest management practices (IPM). IPM involves the strategic use of both biologicals and conventional agrochemicals to manage pests effectively and sustainably. BASF Agricultural Solutions has developed a biocontrol product capable of targeting hard-to-reach caterpillars. From their lab in Research Triangle Park, researchers use a stereomicroscope connected to a computer to examine microscopic nematodes. One such nematode, *Steinernema carpocapsae*, is an insect-parasitic species and a natural enemy of the codling moth caterpillar. Acting as a living insecticide, these nematodes feed on caterpillars in large groups, rendering them harmless to fruit. BASF's BioSolutions offer a complementary or alternative approach to conventional crop protection products. They are rooted in natural partnerships that enhance plant health, such as fungi that form protective shields against pathogens. These solutions may include beneficial nematodes, microorganisms, and pheromones that defend plants against pests, as well as organisms formulated as seed treatments and inoculants that boost crop quality and yield globally.

Derived from natural materials like microorganisms, plant extracts, and beneficial insects, biologicals offer numerous advantages over conventional chemical pesticides and fertilizers. They not only enhance crop health and yield but also minimize environmental impact, promote biodiversity, and reduce energy consumption.

The growing trend of integrating biologicals with conventional methods has several implications for the U.S. Agricultural Biologicals Market. Firstly, it expands the potential market for these products, as farmers who are not yet prepared to transition entirely to organic farming can adopt biologicals as part of their IPM strategies.

The integration trend enhances the perceived effectiveness of biologicals. By utilizing them alongside conventional products, farmers can achieve improved pest management outcomes without compromising crop yield or quality. The Integrated Organic Farming System (IOFS) presents an innovative solution for balancing food production with environmental sustainability. By minimizing or eliminating chemical use, IOFS promotes the reprocessing and reuse of agricultural residues, creating a sustainable model that closely mirrors natural processes and aligns with the principles of a circular economy.

This trend stimulates innovation in the market. Companies are incentivized to develop new products that can effectively complement conventional methods, resulting in a wider range of available products. This fosters continuous improvement and enables

farmers to tailor their pest management approaches to suit individual needs and conditions, ultimately propelling sustainable agricultural practices forward.

Segmental Insights

Product Type Insights

Based on the category of product type, the microbials segment emerged as the leading contender in the United States agricultural biologicals market. Microbials, including bacteria, fungi, viruses, and protozoa, have gained prominence as a potent and sustainable solution in agriculture. Leveraging the capabilities of these microscopic organisms, farmers unlock a plethora of benefits for their crops and the environment alike. These diminutive allies play a pivotal role in enhancing plant growth, bolstering crop yield, and effectively managing pests and diseases. Offering a natural and environmentally friendly alternative to conventional chemical pesticides and fertilizers, microbials have garnered significant attention and adoption in the agricultural sector.

In the United States, the integration of biologicals with conventional farming practices is witnessing notable traction. This burgeoning trend has spurred farmers to embrace integrated pest management strategies, often leveraging microbials as key components. By embracing this approach, farmers not only diminish their reliance on synthetic chemicals but also foster a more harmonious and resilient agricultural ecosystem. Consequently, the demand for microbial products has experienced a steady ascent, reflecting the growing acknowledgment of their efficacy and environmental advantages.

The ascendancy of microbials can be ascribed, in part, to remarkable technological advancements. Modern tools and methodologies have revolutionized the exploration and application of microorganisms in agriculture. Leveraging these cutting-edge technologies, scientists can now isolate, identify, and scale the production of beneficial microorganisms with unprecedented efficiency. This has facilitated the creation of highly efficacious microbial products tailored to address specific agricultural challenges with precision. Through the adept utilization of technology, the agricultural industry is harnessing the full potential of microbials, ushering in a new epoch of sustainable farming methodologies.

Mode of Application Insights

Based on the mode of application, seed treatment have emerged as the fastest growing segment in the United States Agricultural Biologicals Market during the forecast period.

The benefits of biological seed treatments extend beyond individual farms, aligning with the broader objectives of sustainable agriculture. As the United States witnesses a notable shift towards environmentally conscious farming practices, biological seed treatments emerge as pivotal players in this transition. Diverging from conventional chemical treatments, these alternatives offer an environmentally friendly approach, curbing reliance on synthetic pesticides and mitigating potential adverse impacts on ecosystems and human health.

Beyond the environmental advantages, seed treatments also yield economic benefits. They often prove to be more cost-effective compared to traditional pest and disease management methods. By treating seeds prior to planting, farmers can reduce the volume of products required for field applications, resulting in potential savings in both material costs and labor. Also, the reduced dependence on field applications can alleviate the financial strain associated with equipment costs linked to conventional pest and disease management practices.

Regional Insights

The Midwest region emerged as a dominant region in the United States Agricultural Biologicals Market in 2023, commanding the largest market share in terms of value. Renowned for its conducive farming conditions, the Midwest boasts fertile soil and a favorable climate, ideal for cultivating a diverse array of crops. These optimal conditions have positioned the Midwest as a prime destination for the application of agricultural biologicals, innovative solutions that harness natural elements to bolster crop productivity and sustainability.

Farmers in the Midwest have embraced the growing demand for organic and sustainable food, coupled with heightened concerns about the environmental impact of chemical pesticide usage. This shift in awareness has spurred a significant adoption of agricultural biologicals as eco-friendly alternatives to conventional chemical pesticides. By integrating these solutions into their practices, Midwest farmers are not only safeguarding crop health and land integrity but also contributing to broader ecosystem well-being.

The uptake of agricultural biologicals in the Midwest represents more than just a passing trend; it signifies a fundamental transformation in farming methodologies. It underscores a commitment to sustainable agriculture, where farmers prioritize ecological equilibrium, soil vitality, and biodiversity preservation. Through the incorporation of agricultural biologicals, Midwest farmers are reaping benefits such as

enhanced crop yields and disease resistance while fostering a harmonious coexistence between agriculture and nature.

Key Market Players

BASF Corporation

Syngenta Crop Protection Inc.

Bayer Corporation

Evogene Ltd.

Vegalab Inc.

Report Scope:

In this report, the United States Agricultural Biologicals Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

United States Agricultural Biologicals Market, By Product Type:

Microbials

Macrobials

Semiochemicals

Natural Products

United States Agricultural Biologicals Market, By Mode of Application:

Foliar Spray

Soil Treatment

Seed Treatment

Others

United States Agricultural Biologicals Market, By Region:

North-East

Mid-West

South

West

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the United States Agricultural Biologicals Market.

Available Customizations:

United States Agricultural Biologicals Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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