

# **Biorational Pesticides Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, 2018-2028 Segmented By Source (Botanical, Microbial, Non-Organic), By Crop Type (Fruits & Vegetables, Cereals & Grains, Oilseeds & Pulses, Others), By Region and Competition**

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## **Abstracts**

Global Biorational Pesticides Market was valued at USD6.85 billion in 2022 and is anticipated to project robust growth in the forecast period with a CAGR of 4.78% through 2028. Pesticides play a crucial role in agriculture, but their toxicity and ecological impact can vary significantly. That's where biorational pesticides come in - they are a class of pesticides that offer a safer and more environmentally friendly alternative. These organic or biopesticides are not only inexpensive but also promote the early detection and control of pests, making them highly sought after in the forestry, gardening, and agricultural sectors.

The biorational pesticides market is experiencing significant growth due to various factors. Firstly, the increasing demand for residue-free organic crops has fueled the adoption of biorational pesticides. Moreover, the agricultural sector's growth and the rising utilization of integrated pest management practices have further boosted the market. Governments worldwide have also taken initiatives to promote the use of biorational pesticides, recognizing their non-toxic nature and low environmental impact. Additionally, consumers' growing awareness of environmental issues and concerns about the toxicity of chemical pesticides have contributed to the market's expansion.

Furthermore, the biorational pesticides market is positively influenced by factors such as consumer preference for organic food, advancements in farming practices and

technology, and the demand for high-quality produce. The significant crop losses caused by pest attacks have further emphasized the need for effective pest management solutions like biorational pesticides. Also, the surge in investment in agricultural activities and the untapped market potential in developing nations offer promising opportunities for players in the biorational pesticides market.

However, there are certain challenges that need to be addressed. Limited product availability and the relatively short shelf life of biorational pesticides pose obstacles to market growth. Additionally, the lack of basic infrastructure in some regions may hinder the widespread adoption of biorational pesticides.

Despite these challenges, the biorational pesticides market holds immense potential for sustainable agriculture and environmentally friendly pest management practices. With ongoing research and development efforts, we can expect further advancements in biorational pesticide formulations and increased market availability in the future.

## Key Market Drivers

### Growing Demand for Sustainable Agriculture

Sustainable agriculture is an approach that aims to meet society's present food needs while ensuring that future generations can do the same. This holistic approach emphasizes the use of farming techniques that are not only environmentally sound but also economically viable and socially responsible.

With increasing awareness of environmental concerns and a growing demand for healthier food options, there has been a significant shift towards more sustainable farming practices. This transition has led to a higher demand for biorational pesticides, which are products that align with the principles of sustainability.

Biorational pesticides, often referred to as 'soft' pesticides, are derived from natural materials such as animals, plants, bacteria, and minerals. Unlike conventional synthetic pesticides, these pesticides are typically target-specific and pose less harm to beneficial insects and the environment.

The rising demand for residue-free organic crops and the use of ecologically sustainable technology are key factors driving the growth of the biorational crop protection market. Moreover, the increasing demand for environmentally friendly and sustainable agricultural practices has further contributed to the substantial growth of this

market.

By adopting sustainable farming practices and utilizing biorational pesticides, farmers can contribute to a more sustainable and environmentally conscious agricultural industry. This not only ensures the long-term availability of food but also helps preserve our natural resources for future generations.

### Rising Advancements in Biotechnology

Biorational pesticides, also known as biopesticides, are derived from natural substances such as animals, plants, bacteria, and minerals. These substances are carefully selected and formulated to target specific pests while minimizing harm to beneficial insects and the environment. Compared to conventional synthetic pesticides, biorational pesticides offer a more sustainable and eco-friendly solution for pest control.

Biotechnology plays a crucial role in the development and production of biorational pesticides. Through techniques like genetic engineering and microbial fermentation, biotechnology enables the creation of highly effective and precise pesticides. By harnessing the power of nature, scientists are able to enhance the pest-fighting capabilities of these biopesticides, making them more potent and reliable.

Microbial pesticides, a significant segment of the biorational pesticides market, exemplify the impact of biotechnology in driving innovation. These pesticides utilize microorganisms or their metabolic products to control pests effectively. By leveraging the natural abilities of these microorganisms, such as their ability to produce toxins or disrupt pest life cycles, microbial pesticides provide a safer and more sustainable alternative to synthetic pesticides.

The advancements in biotechnology have revolutionized the biorational pesticides market. Through continuous research and development, scientists have been able to create innovative products that are more efficient, environmentally friendly, and economically viable. These biotechnological breakthroughs have expanded the scope and potential of the biorational pesticides market, offering new opportunities for sustainable pest management.

Furthermore, the increasing demand for organic and sustainable farming practices has further fueled the growth of the biorational pesticides market. Farmers are becoming more aware of the detrimental effects of synthetic pesticides on human health, beneficial insects, and the environment. As a result, they are actively seeking safer and

more sustainable alternatives, leading to a greater adoption of biorational pesticides.

## Key Market Challenges

### Limited Efficacy of Biorational Pesticides Against Certain Pests

Biorational pesticides, also known as biopesticides, are derived from naturally occurring substances such as plants, animals, bacteria, and minerals. They are celebrated for their target-specific action and their reduced impact on beneficial insects and the environment compared to synthetic pesticides. These biopesticides offer a promising alternative for pest control in agriculture and have gained attention for their potential to mitigate the negative effects of conventional pesticides.

However, it is important to note that the effectiveness of biorational pesticides can vary significantly depending on the type of pest they are targeting. Several studies have indicated that certain pests may exhibit limited susceptibility to biorational pesticides. For example, Brinjal, a crop susceptible to approximately 140 species of insect pests, has shown varying levels of response to different biopesticides. Similarly, the efficacy of biorational insecticides against *Bemisia tabaci*, a globally significant agricultural pest, has been found to be inconsistent.

Furthermore, the efficacy of biorational pesticides can also be influenced by the life cycle of the target pest. While some biopesticides effectively disrupt the life cycle of certain pests, others may not have the same impact. This inconsistency in efficacy poses a challenge to the broader acceptance and usage of biorational pesticides in agriculture.

The limited efficacy of biorational pesticides against certain pests could potentially pose a significant challenge to the global biorational pesticides market. If these products cannot consistently provide effective pest control, farmers and other potential users may be hesitant to adopt them, thereby limiting the growth of the market.

In conclusion, while biorational pesticides offer promising benefits in terms of target-specific action and reduced environmental impact, their effectiveness can be influenced by various factors. Further research and development efforts are needed to address the challenges associated with their limited efficacy against certain pests and to enhance their overall performance in agricultural pest control.

## Key Market Trends

## Rising Advancements in Formulations and Delivery Systems

Biorational pesticides, derived from natural substances such as animals, plants, bacteria, and minerals, offer a sustainable and environmentally friendly alternative to conventional synthetic pesticides. These target-specific pesticides pose less harm to beneficial insects and the ecosystem as a whole. Their efficacy is not only influenced by their active ingredients but also by their formulation and delivery methods.

The development of advanced formulations and delivery systems has revolutionized the effectiveness of biorational pesticides. Technological advancements have allowed the encapsulation of bioactive compounds within protective shells, enhancing their stability and extending their shelf life. This not only ensures the longevity of these pesticides but also improves their potency.

Moreover, innovative delivery systems, such as microencapsulation and nanoemulsion techniques, have emerged as game-changers in the field. These techniques enable precise and targeted delivery of biorational pesticides, maximizing their effectiveness while minimizing off-target impacts. By directly reaching the intended pests, these delivery systems reduce environmental contamination and minimize harm to non-target organisms.

These remarkable advancements have had a profound impact on the global biorational pesticides market. The improved formulations not only enhance the stability and potency of these pesticides but also make them more versatile for use in various agricultural applications. Furthermore, the efficient delivery systems contribute to the rising popularity of biorational pesticides in sustainable farming practices, as they ensure precise and responsible application.

## Segmental Insights

### Source Insights

Based on the category of source, the botanical segment emerged as the dominant player in the global market for biorational pesticides in 2022. One of the main reasons for the dominance of botanicals in the global biorational pesticides market is the increased demand for organic food products. As consumers become more health-conscious and aware of the potential harmful effects of synthetic pesticides on food and the environment, they are actively seeking out safer alternatives. This shift in consumer

behavior is driving the demand for organic farming practices, which often involve the use of botanical pesticides.

Evolving farming technologies and practices are also contributing to the rise of botanical pesticides. Farmers are increasingly adopting sustainable and eco-friendly farming practices, recognizing the importance of preserving the health of the environment and ensuring the long-term viability of their crops. Natural pest control methods, such as the use of botanical pesticides derived from plants, are seen as a perfect fit within this sustainable model.

By choosing botanical pesticides, farmers are not only protecting their crops from pests but also minimizing the impact on the environment and promoting biodiversity. These natural alternatives offer a holistic approach to pest management, integrating well with other sustainable farming practices and contributing to the overall health and resilience of agricultural systems. With the growing emphasis on sustainable agriculture, the demand for botanical pesticides is expected to continue rising as more farmers recognize their benefits and consumers continue to prioritize organic and environmentally friendly food products.

### Crop Type Insights

The cereals & grains segment is projected to experience rapid growth during the forecast period. One of the primary drivers for the use of biorational pesticides in cereals and grains is the increased demand for organic food products. As consumers become more health-conscious and environmentally aware, there is a growing preference for organically grown foods. Cereals and grains, being staple food items in many diets around the world, have witnessed a significant surge in demand for their organic variants. This shift in led to the consumer to the adoption of b preference has led to the adoption of biorational pesticides in organic farming practices for cereals and grains cultivation. These pesticides are known for their reduced environmental impact and minimal harm to beneficial insects, making them an ideal choice for sustainable crop protection.

Another significant factor contributing to the dominance of cereals and grains in the biorational pesticides market is the high demand for crop protection activities. Cereals and grains are particularly susceptible to a wide range of pests and diseases, posing a constant threat to crop yield and quality. In order to effectively control these pests and ensure successful harvests, farmers rely on biorational pesticides. These pesticides offer a sustainable and eco-friendly solution for protecting cereals and grains from

pests, making them a preferred choice in the crop protection segment. The use of biorational pesticides not only helps in maintaining crop health but also promotes the overall sustainability of agricultural practices.

## Regional Insights

North America emerged as the dominant player in the Global Biorational Pesticides Market in 2022, holding the largest market share in terms of value. One of the primary reasons for North America's dominance in the biorational pesticides market is its well-established organic farming practices. The region has a long history of organic farming, which naturally incorporates the use of biorational pesticides. These eco-friendly pesticides, derived from natural sources, are less harmful to the environment and beneficial insects, making them an ideal choice for organic farming.

Furthermore, North America's commitment to sustainable agriculture and environmental stewardship has played a significant role in the widespread adoption of biorational pesticides. The region's stringent regulations and standards ensure that only safe and effective pesticides are used in organic farming practices. This not only protects the health of consumers but also promotes biodiversity and ecosystem balance.

Moreover, the increasing demand for organic food products in North America has been a driving force behind the growing popularity of organic farming practices. Health-conscious consumers are becoming more aware of the potential health risks associated with conventional pesticides and are actively seeking out organically grown foods. This consumer demand has created a market niche for organic farmers who rely on biorational pesticides to protect their crops while maintaining the integrity of organic farming principles.

In conclusion, North America's dominance in the biorational pesticides market can be attributed to its well-established organic farming practices, commitment to environmental sustainability, and the increasing demand for organic food products. These factors have created a fertile ground for the growth of biorational pesticides and have positioned North America as a leader in the field of eco-friendly pest management.

## Key Market Players

BASF SE

Bayer AG

DuPont de Nemours Inc

Isagro S.p.A.

Koppert BV

Marrone Bio Innovations, Inc.

Monsanto Co

Russell Investment Management LLC

Syngenta AG

Valent BioSciences LLC

Report Scope:

In this report, the Global Biorational Pesticides Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Global Biorational Pesticides Market, By Source:

Botanical

Microbial

Non-Organic

Global Biorational Pesticides Market, By Crop Type:

Fruits & Vegetables

Cereals & Grains

Oilseeds & Pulses



Others

Global Biorational Pesticides Market, By Region:

North America

United States

Canada

Mexico

Europe

France

United Kingdom

Italy

Germany

Spain

Asia-Pacific

China

India

Japan

Australia

South Korea

South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

### Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Biorational Pesticides Market.

### Available Customizations:

Global Biorational Pesticides Market report with the given market data, Tech Sci 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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