

RNAi Pesticides Market Forecasts to 2032 – Global Analysis By Product (Topical RNAi Pesticides, Seed-Embedded RNAi, Transgenic RNAi and Other Products), Crop Type, Formulation, Technology, Application, End User and By Geography

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Abstracts

According to Statistics MRC, the Global RNAi Pesticides Market is accounted for \$1.54 billion in 2025 and is expected to reach \$3.38 billion by 2032 growing at a CAGR of 11.9% during the forecast period. RNAi (RNA interference) pesticides are a new class of biopesticides that use gene-silencing technology to control pests by targeting specific genes essential for their survival or reproduction. These pesticides work by introducing double-stranded RNA (dsRNA) molecules that match sequences in the pest's genome. When ingested, the pest's cellular machinery degrades the matching messenger RNA (mRNA), effectively "switching off" the target gene and disrupting vital biological processes. RNAi pesticides offer high precision, reducing harm to non-target species and the environment. They represent a sustainable alternative to conventional chemical pesticides, promoting safer and more targeted pest management in agriculture.

Market Dynamics:

Driver:

High target specificity & lower non-target toxicity

RNA interference enables gene silencing in pest species without affecting beneficial organisms or surrounding ecosystems. Platforms support selective control of insects weeds and pathogens using molecular targeting and biodegradable formulations. Integration with precision agriculture regulatory frameworks and resistance

management enhances field performance and compliance. Demand for safe effective and environmentally aligned solutions is rising across commercial farms cooperatives and agtech startups. These dynamics are propelling platform deployment across next-generation pesticide ecosystems.

Restraint:

Environmental stability & field persistence issues

RNA molecules degrade rapidly under UV exposure temperature shifts and microbial activity which reduces field longevity and impact. Enterprises face challenges in optimizing formulation delivery and encapsulation to improve durability and uptake. Lack of standardized protocols and region-specific performance data further complicates adoption and trust. Vendors must invest in nanocarriers protective coatings and controlled release systems to enhance stability. These constraints continue to hinder platform maturity across open-field and climate-sensitive agricultural zones.

Opportunity:

Growing demand for sustainable agriculture solutions

Consumers and regulatory bodies increasingly favor residue-free and environmentally safe products; RNAi-based pesticides provide a targeted approach that minimizes harm to non-target species and ecosystems. These biotechnological solutions help reduce chemical pesticide dependence, aligning with global initiatives for sustainable and regenerative farming. Moreover, RNAi pesticides offer long-term pest resistance management, enhancing crop health and productivity without compromising soil quality. The rising emphasis on sustainable farming practices, coupled with government support for green technologies, further accelerates the market's expansion.

Threat:

Variable efficacy across pest species and delivery routes

Different pests exhibit varying sensitivity uptake and gene expression which complicates uniform control and dosage optimization. Enterprises face challenges in designing broad-spectrum or multi-target RNAi formulations without compromising specificity. Lack of delivery standardization and crop compatibility further limits scalability and operational efficiency. Vendors must offer modular design pest profiling and adaptive

delivery systems to improve consistency. These limitations continue to constrain platform performance across diverse and multi-pest agricultural environments.

Covid-19 Impact:

The pandemic disrupted field trials supply chains and regulatory engagement across RNAi pesticide development. Lockdowns delayed product validation stakeholder outreach and commercial rollout while increasing demand for sustainable and low-residue crop protection. Investment in remote sensing digital agronomy and molecular R&D surged across public and private sectors. RNAi platforms gained traction as scalable safe and precision-aligned alternatives to conventional pesticides. Public awareness of food safety environmental impact and biological inputs increased across policy and consumer circles. These shifts are reinforcing long-term investment in RNAi-enabled and resilience-focused pesticide infrastructure.

The topical RNAi sprays segment is expected to be the largest during the forecast period

The topical RNAi sprays segment is expected to account for the largest market share during the forecast period due to their ease of application rapid uptake and compatibility with existing farm practices. Platforms support foliar delivery of RNA molecules for pest suppression without genetic modification or systemic exposure. Integration with drone spraying smart irrigation and weather tracking enhances precision and field coverage. Demand for non-invasive flexible and residue-free solutions is rising across fruits vegetables and high-value crops. Vendors offer ready-to-use formulations shelf-stable packaging and crop-specific protocols to support adoption. These capabilities are boosting segment dominance across topical RNAi pesticide platforms.

The seed-embedded RNAi segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the seed-embedded RNAi segment is predicted to witness the highest growth rate as platforms expand across pre-emergent pest control and systemic protection. RNA molecules are embedded within seed coatings or matrices to deliver targeted gene silencing during germination and early growth. Platforms support long-duration control reduced application frequency and integration with seed treatment workflows. Integration with crop genetics regulatory labeling and precision planting enhances scalability and compliance. Demand for embedded durable and low-labor solutions is rising across cereals pulses and industrial crops. These dynamics are

accelerating growth across seed-based RNAi pesticide platforms and services.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share due to its regulatory engagement research infrastructure and institutional investment across RNAi pesticide technologies. Enterprises deploy platforms across corn soybean and specialty crop segments to meet resistance management and sustainability goals. Investment in molecular biology field validation and EPA alignment supports innovation and commercialization. Presence of leading vendor's academic institutions and agtech accelerators drives ecosystem depth and adoption. Firms align RNAi strategies with USDA mandates ESG reporting and export compliance. These factors are propelling North America's leadership in RNAi pesticide deployment and governance.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR as pest pressure crop diversity and digital agriculture converge across regional economies. Countries like India China Indonesia and Vietnam scale RNAi platforms across rice cotton and horticulture segments. Government-backed programs support biotech incubation sustainable inputs and farmer education across pesticide innovation. Local providers offer cost-effective mobile-first and culturally adapted solutions tailored to smallholder and cooperative needs. Demand for scalable inclusive and residue-free crop protection is rising across urban and rural agricultural zones. These trends are accelerating regional growth across Asia Pacific's RNAi pesticide innovation and deployment.

Key players in the market

Some of the key players in RNAi Pesticides Market include GreenLight Biosciences Inc., Syngenta AG, Bayer AG, Monsanto Company, Corteva Inc., AgBiome Inc., BioDirect Inc., Pioneer Hi-Bred International Inc., Vestaron Corporation, Precision BioSciences Inc., RNAissance Ag LLC, Evogene Ltd., Intrexon Corporation, Monsanto BioDirect and GreenVenus LLC.

Key Developments:

In July 2025, Syngenta expanded its biologicals portfolio through the acquisition of

Intrinsyx Bio, a biotech firm specializing in nature-based crop protection. The acquisition supported Syngenta's RNAi and biostimulant pipeline, reinforcing its commitment to sustainable farming and positioning it for leadership in the projected \$20 billion biologicals market.

In May 2023, GreenLight Biosciences entered a definitive agreement to be acquired by a consortium led by Fall Line Endurance Fund in an all-cash transaction valued at \$45.5 million. The go-private deal aimed to streamline operations and refocus resources on RNA pesticide commercialization and biomanufacturing scale-up.

Products Covered:

Topical RNAi Pesticides

Seed-Embedded RNAi

Transgenic RNAi

Other Products

Crop Types Covered:

Agricultural Crops

Cereals & Grains

Fruits & Vegetables

Oilseeds & Pulses

Non-Agricultural Applications

Turf & Ornamentals

Other Crop Types

Formulations Covered:

Liquid

Powder

Granular

Encapsulated

Other Formulations

Technologies Covered:

Topical RNAi Sprays

Seed-Embedded RNAi Solutions

Transgenic RNAi Crops

Nanoparticle-Based RNAi Delivery Systems

Applications Covered:

Insect Pest Control

Weed Management

Disease Management

Resistance Management

Other Applications

End Users Covered:

Farmers and Growers

Agricultural Cooperatives

Research Institutions

Government and Regulatory Agencies

Other End Users

Regions Covered:

North America

US

Canada

Mexico

Europe

Germany

UK

Italy

France

Spain

Rest of Europe

Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

What our report offers:

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2024, 2025, 2026, 2028, and 2032
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)

- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

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