

# **Agricultural Enzymes Market Forecasts to 2032 – Global Analysis By Enzyme Type (Dehydrogenases, Phosphatases, Sulfatases, Proteases, Carbohydrases, Ureases and Other Enzyme Types), Functionality (Fertility Enhancing Products, Control Products, Growth Promoting Products and Other Functionalities), Formulation, Production Source, Mode of Delivery, Crop and By Geography**

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## **Abstracts**

According to Statistics MRC, the Global Agricultural Enzymes Market is accounted for \$658.4 million in 2025 and is expected to reach \$1,349.7 million by 2032 growing at a CAGR of 10.8% during the forecast period. Agricultural enzymes are bioactive proteins that catalyze biochemical reactions in soil and crops, enhancing nutrient availability, soil fertility, and plant growth. They decompose organic matter, convert complex compounds into absorbable nutrients, and support microbial activity. Commonly used enzymes include phosphatases, ureases, and dehydrogenases, which aid in nitrogen and phosphorus cycling. These enzymes play a vital role in sustainable farming by reducing chemical input reliance, improving crop resilience, and promoting eco-friendly agricultural practices

According to the journal article published in Agricultural & Environmental Letters  $\beta$ -glucosidase and N-acetyl- $\beta$ -glucosaminidase activities were significantly correlated with over 60 soil properties and long-term crop yields across dryland farming systems in the Northern Great Plains, indicating their potential as robust soil health indicators under no-till and tillage crop rotations.

## Market Dynamics:

### Driver:

Growing demand for organic and sustainable farming

As consumers increasingly prefer organically grown produce, farmers are turning to enzyme-based solutions to enhance soil fertility and crop resilience without relying on synthetic chemicals. These enzymes facilitate nutrient cycling, improve plant uptake efficiency, and support microbial activity in the soil. Moreover, sustainable farming practices are being incentivized by governments and certification bodies, further accelerating market penetration. The trend is especially prominent in regions with stringent environmental regulations and high organic food consumption.

### Restraint:

Limited awareness and technical knowledge

Many growers remain unfamiliar with enzyme mechanisms, application protocols, and compatibility with existing agronomic practices. This knowledge gap is compounded by limited access to training resources and extension services, particularly in developing economies. Additionally, misconceptions about enzyme efficacy and cost-effectiveness persist, slowing market expansion. Without targeted educational initiatives and demonstration programs, the full potential of enzyme-based agriculture may remain underutilized.

### Opportunity:

Development of novel enzyme formulations

Researchers are engineering enzymes with enhanced stability, broader pH tolerance, and improved substrate specificity to optimize agricultural outcomes. These innovations are enabling precision farming applications, such as targeted nutrient release and pest resistance enhancement. Furthermore, collaborations between biotech firms and agricultural institutions are fostering the commercialization of proprietary enzyme blends, opening new revenue streams. The growing demand for customized, high-performance inputs presents a lucrative opportunity for market players.

### Threat:

## Varying and stringent regulatory frameworks

In some countries, enzymes are classified under biofertilizers or biopesticides, requiring extensive safety and efficacy data before market entry. These regulatory hurdles can delay product launches and increase compliance costs for manufacturers. Moreover, evolving standards related to environmental impact, residue levels, and microbial safety may necessitate frequent reformulations. The lack of harmonized global guidelines creates uncertainty for international trade and limits scalability for emerging players.

## Covid-19 Impact:

The COVID-19 pandemic disrupted agricultural supply chains, affecting the availability and distribution of enzyme-based products. Lockdowns and labor shortages led to delays in field trials, manufacturing, and logistics, particularly in regions dependent on imports. However, the crisis also underscored the importance of resilient and sustainable farming systems, prompting renewed interest in biological inputs. As farmers sought alternatives to chemical fertilizers amid supply constraints, agricultural enzymes gained traction for their eco-friendly and soil-enhancing properties.

The dehydrogenases segment is expected to be the largest during the forecast period

The dehydrogenases segment is expected to account for the largest market share during the forecast period due to their critical role in catalyzing oxidation-reduction reactions that influence plant metabolism. These enzymes enhance nutrient assimilation and stress tolerance, making them highly effective in improving crop yield and quality. Their versatility across various soil conditions and compatibility with organic farming practices contribute to their widespread use. Additionally, ongoing research into microbial sources of dehydrogenases is expanding their application in biofertilizers and biostimulants, reinforcing their market leadership.

The fertility enhancing products segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the fertility enhancing products segment is predicted to witness the highest growth rate driven by increasing demand for soil rejuvenation and nutrient optimization. These enzyme-based formulations improve root development, boost microbial activity, and facilitate the breakdown of organic matter, leading to healthier soil ecosystems. As concerns over land degradation and declining fertility

intensify, farmers are adopting these products to restore productivity. Innovations in enzyme encapsulation and delivery systems are also enhancing their effectiveness, making them a preferred choice for sustainable agriculture.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share attributed to the advanced farming infrastructure, high awareness of sustainable practices, and strong regulatory support. The region benefits from robust R&D investments and the presence of key industry players offering innovative enzyme solutions. Adoption is particularly high in the U.S. and Canada, where organic farming acreage continues to expand. Government incentives and consumer demand for clean-label produce further reinforce market growth, positioning North America as the dominant regional contributor.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR fueled by rising agricultural modernization and increasing food security initiatives. Countries like India, China, and Indonesia are witnessing a surge in demand for biological inputs to combat soil degradation and improve crop resilience. The region's large farming population and growing awareness of sustainable practices are driving enzyme adoption. Additionally, supportive government policies and expanding agri-biotech research are creating fertile ground for market expansion, making Asia Pacific a hotspot for future growth.

Key players in the market

Some of the key players in Agricultural Enzymes Market include Novozymes A/S, BASF SE, dsm-firmenich (Royal DSM), DuPont, AB Enzymes, Advanced Enzyme Technologies Ltd., Amano Enzyme Inc, Kerry Group, Syngenta AG, Bioworks Inc., Stoller Group, Lallemand Plant Care, Verdesian Life Sciences, Chr. Hansen Holding A/S, Longda Bio-Products, Aumgene Biosciences, Genencor, and Lesaffre.

Key Developments:

In June 2025, DuPont announced that 13 current and former DuPont scientists/engineers were named 2025 "Heroes of Chemistry" by the American Chemical Society for advances in semiconductor lithography. The release highlights the

innovations recognized and positions DuPont's R&D contributions to semiconductor materials.

In May 2025, BASF announced that it began producing renewable ammonia in Central Europe by replacing fossil hydrogen with renewable-energy-derived hydrogen in ammonia production. The release frames this as a milestone for decarbonizing the ammonia value chain and notes plans to expand related sustainable products.

#### Enzyme Types Covered:

Dehydrogenases

Phosphatases

Sulfatases

Proteases

Carbohydrases

Ureases

Other Enzyme Types

#### Functionalities Covered:

Fertility Enhancing Products

Control Products

Growth Promoting Products

Other Functionalities

#### Formulations Covered:

Liquid

Powder

Granular

Encapsulated / Controlled-release

Production Sources Covered:

Microbial

Plant-derived

Recombinant & Engineered Enzymes

Other Production Sources

Mode of Deliveries Covered:

Soil Application

Seed Coat

Foliar Spray

Fertilizer Co-formulation

Crops Covered:

Oilseeds & Pulses

Cereals & Grains

Turf & Ornamentals

Fruits & Vegetables

Other Crops

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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