GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET RESEARCH REPORT

FORECAST TO 2027

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GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET

The global agricultural biotechnology market was valued at **USD XX** million in 2019 and is expected to reach **USD XX** million in 2027 with a compound annual growth rate (CAGR) of **XX%** during the forecast period 2020–2027.

Global Agricultural Biotechnology Market Share, By Region, 2019

- Americas
- Asia-Pacific
- Europe
- Middle East & Africa

Drivers

- Increasing Cultivation of Biotech Crops Across the Globe
- High Investment in Agriculture Research and Development

Restraints

- Unfavorable Scenario for Cultivation of Genetically Engineered Crops in Europe

Key Players

CORTEVA agriscience
Arcadia BIOSCIENCES
evogene
BAYER
eurofins

1 EXECUTIVE SUMMARY

Agricultural biotechnology is the use of different scientific techniques to modify plants to produce genetically modified plants. Biotechnology plays an important role in increasing resistance of plants towards a disease or any harsh environmental condition and also improving agriculture productivity. The factors leading to the growth of the global agricultural biotechnology market are increasing cultivation of biotech crops across the globe and high investment in agriculture research and development. However, unfavorable scenario of the cultivation of genetically engineered crops in Europe are posing hurdles to the market growth at the global level.

TABLE 1 MARKET SYNOPSIS

Source: MRFR Analysis

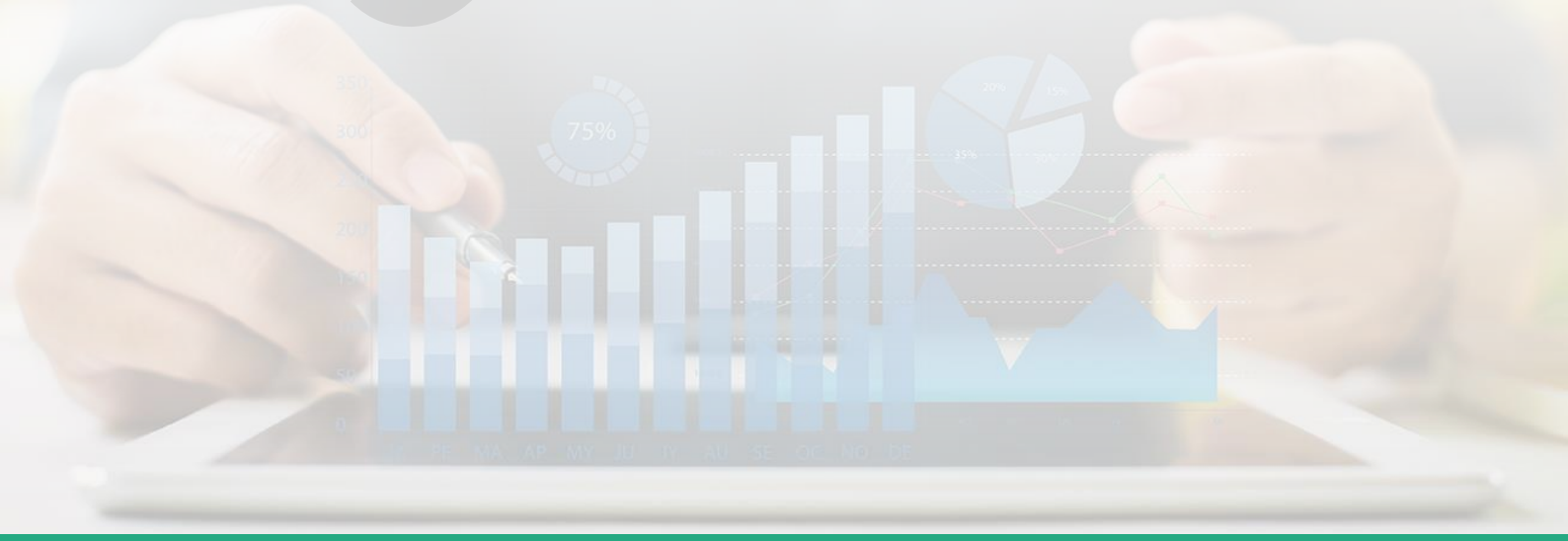
2 MARKET INTRODUCTION

2.1 SCOPE OF THE STUDY

The scope of the global agricultural biotechnology market study includes market size analysis and a detailed analysis of the manufacturer's products and strategies. The market has been segmented based on crop type, application, technology, and region.

2.2 RESEARCH OBJECTIVE

- To provide a comprehensive analysis of the global agricultural biotechnology market and its sub-segments, thereby providing a detailed structure of the industry
- To provide detailed insights into factors driving and restraining the growth of the global agricultural biotechnology market
- To estimate the market size of the global agricultural biotechnology market where 2017 to 2018 would be the historic period, 2019 shall be the base year, and 2020 to 2027 will be the forecast period for the study
- To provide country-wise market value analysis for various segments of the global agricultural biotechnology market
- To provide strategic profiling of key companies (manufacturers and distributors) present across the globe and comprehensively analyze their competitiveness/competitive landscape in this market
- To provide a distribution chain analysis/value chain for the global agricultural biotechnology market



2.3 LIST OF ASSUMPTIONS

TABLE 2 LIST OF ASSUMPTIONS

Parameter	Assumption & Limitations
Currency value	All forecasts have been made with the revenue and value calculated under the standard assumption that the value of the globally accepted currency, the US dollar, remains constant over the next five years.
Exchange Rates and Currency Conversion	For the conversion of various currencies to USD, the average historical exchange rates have been used according to the year specified. For all historical and current exchange rates required for calculations and currency conversions, the OANDA website has been used in this research study.
Niche Market Segments	For niche market segments where accurate data of the respective timeline was not available, the data were calculated using trend line analysis. In some instances, where mathematical and statistical models could not be applied to arrive at the number, a generalization of specifically related trends to that particular market has been made.
Qualitative Analysis	The qualitative analysis is arrived at from the quantitative data based on the understanding of the market and its trends by the team of experts involved in making this report.
Average Selling Prices (ASP)	The ASP, wherever applicable, was calculated using all kinds of suitable statistical and mathematical methods and considering external qualitative factors affecting the price. All the calculations are interconnected based on the finalized ASPs.

Source: MRFR Analysis

FIGURE 1 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET STRUCTURE

BY CROP TYPE	BY APPLICATION	BY TECHNOLOGY	BY REGION
▪ Soybean	▪ Herbicide Tolerance	▪ Genetic Engineering	▪ Americas
▪ Maize	▪ Insect Tolerance	▪ Molecular Markers	▪ Asia-Pacific
▪ Cotton	▪ Virus Tolerance	▪ Molecular Diagnostics	▪ Europe
▪ Other	▪ Others	▪ Tissue Culture	▪ Middle East & Africa

3 RESEARCH METHODOLOGY

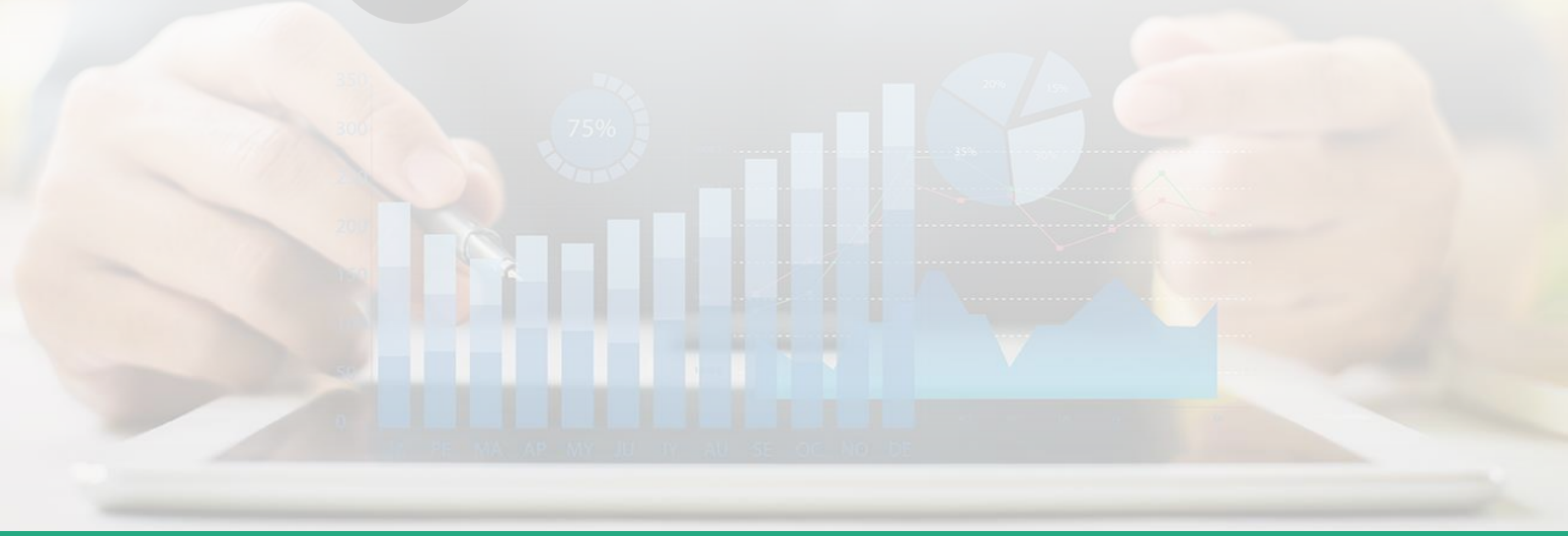
3.1 OVERVIEW

The research starts with the extensive procurement process of data/information and statistics from company annual reports, government websites, statistic agencies, and paid databases. This information creates a base for the study. This information also helps to define the scope and to narrow down the area for study for the market. This raw information is processed and analyzed to extract crisp data points which currently affect or are likely to affect the industry over the forecast period. After analyzing the information, a proprietary statistical tool is used for market estimation & forecast, which generates the quantitative figures/sizes of the market/sub-segments in the current scenario as well as for over the forecast period.

After estimating the market sizes & estimates, numbers are verified with the industry participants and key opinion leaders. The wide network of industry participants performs a value addition in the research and verify the numbers & estimates of the study. In the last stage of the research process, a final report is prepared, which is then published on different websites as well as distributed through various channels. Below figure contains the different stages of the whole research performed to produce the report.

3.2 DATA MINING

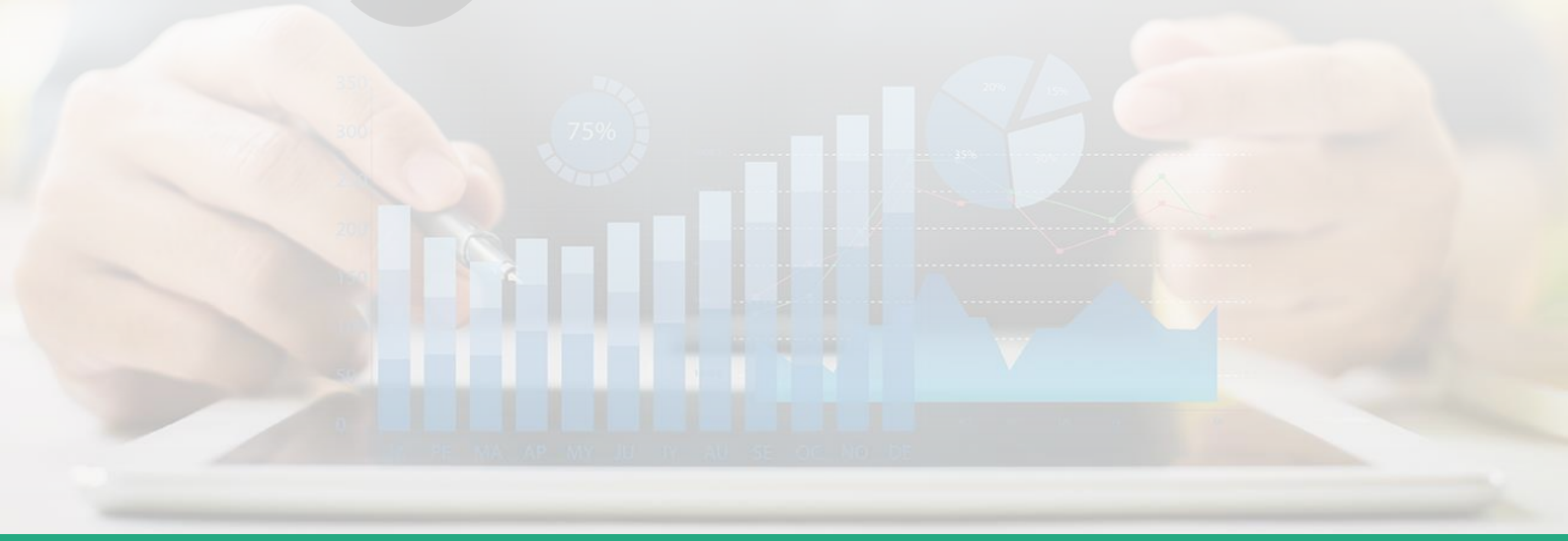
Data mining is one of the extensive stages of our research process. It involves the procurement of market data and related information through different verified & credible sources. This step helps to obtain the raw information about components in the industry and their deployment, the monetary process for different end-uses, the pool of market participants & the nature of the industry, and the scope of the study. The data mining stage comprises both primary as well as secondary sources of information.



3.3 SECONDARY RESEARCH

In the secondary research process, various sources are used to identify and gather industry trends and information for the research process. We at MRFR have access to some of the most diversified and extensive paid databases, which give us the most accurate data/information on market sizes, components, and pricing. Mentioned below is a detailed list of sources that have been used for this study. Please note that this list is not limited to the names as mentioned; we also access other data sources depending on the need.

Market Sizing & Revenue	Qualitative Information & Trends
Company Websites	• White Papers • Magazines • Company Websites • Annual Reports • Press Releases • Investor Presentations • Paid Databases • Authenticated Directories • Independent Studies • Internal Audit Reports & Archives • Government and Regulatory Published Material • FAO • ISAAA • ABF • AgBioWorld • North Carolina Biotechnology Center.
Annual Reports	
Investor Presentations	
Authenticated Directories	
Hoover's, Factiva, Bloomberg	



3.4 PRIMARY RESEARCH

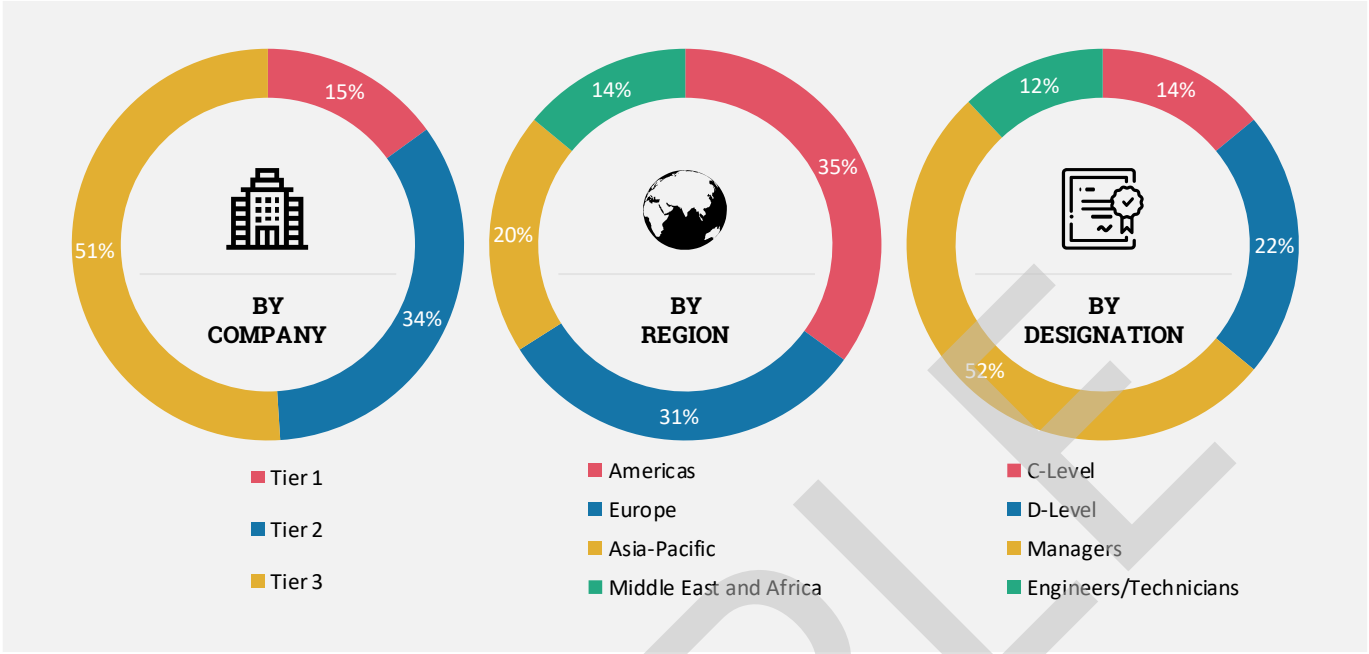
In the primary research process, in-depth primary interviews are conducted with the CXOs to understand the market share, customer base, pricing strategies, and other necessary information. Besides, in-depth primary interviews are conducted with the CXOs of companies, and others to validate the supply-side information. Moreover, various key industry participants from both the supply and demand side are interviewed to obtain qualitative and quantitative information on the market. In-depth interviews with key primary respondents, including industry professionals, subject matter experts (SMEs), industry consultants, and C-level executives of major companies, are conducted to obtain critical qualitative and quantitative information pertaining to the market, as well as to assess the prospects for market growth during the forecast period. Detailed information on these primary respondents is mentioned below.

Primary Source	Service Side Subject Matter Experts, Top Management, and CXOs
	Technical Persons of Organizations Operating in the Market
	Marketing and Business Development Managers, VPs, and Marketing Directors
	Various Partner Consultants from the Demand and Supply Sides

3.4.1 PRIMARY INTERVIEWS AND INFORMATION GATHERING PROCESS

Respondents	Data Points Received
Manufacturer and Distributors	• Market Size • Top of the Mind Key Market Players • Direct Competitors • Company Market Shares • Growth Rate (%) • Market Trends and Prominent Market Drivers • Major Products • Product Cost • Commercial Availability • Regional Scenario (America, Europe, Asia-Pacific, Middle East & Africa) • Data Protection Policies and Other Regulatory Norms • Upcoming Analytical Products
End Users	• Adoption of New Technology • Acceptance Ratio • Analytical Product Cost • Commonly Used Techniques

3.4.2 BREAKDOWN OF PRIMARY RESPONDENTS



3.5 FORECASTING TECHNIQUES

We at MRFR follow an extensive process for arriving at market estimations, which involves the use of multiple forecasting techniques, as mentioned below.

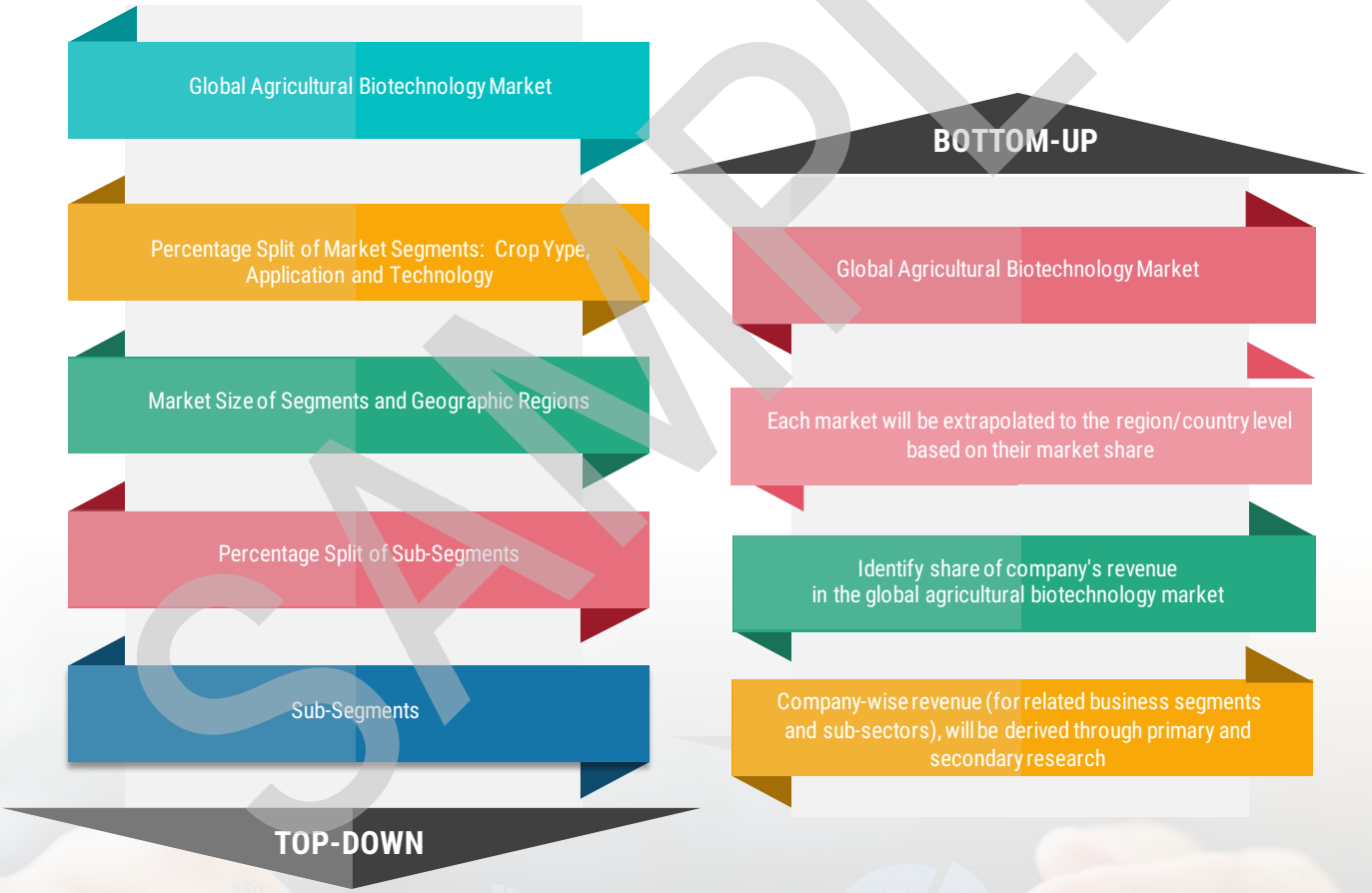
Forecasting Techniques	Description
Qualitative and Quantitative Analysis	A combination of qualitative approach, i.e., primary interviews with industry experts to understand the interviewees' opinions and judgments, more commonly known as the Delphi method, and quantitative analysis to forecast future data based on historical and current data.
Weighted Average Approach	Via this approach, future data is calculated based on the mean of the past data under the assumption that some factors affecting the market in the past will continue to have a similar impact in the future.
Drift Method	This approach is used to vary the forecast, which increases or decrease in market factor over time depending on various parameters affecting the change in the trends of the market.
Time Series Methods	The integration of several time series methods such as moving average, moving weighted average, linear prediction, and trend estimation is applied while determining the year-on-year growth rate and the compound annual growth rate of the market being studied.
Causal/Econometric Forecasting Methods	Various economic factors such as inflation rate, fiscal policies, changes in government regulations, taxes, labor costs, and interest rates are taken into consideration while determining the current market size and predicting the future market growth rate.
Judgmental Methods	This involves the collection of intuitive judgment, opinions, and probability estimates from industry experts in the case of new or upcoming markets/technologies for which no prior data is available.
Regression Analysis	This type of statistical modeling is carried out for predicting and forecasting dependent and independent variables that will directly or indirectly impact the market.
Probabilistic Forecasting	This forecasting method is carried out to assign a probability to every possible outcome ranging from the least optimistic to highly optimistic, which helps in gauging the market under stable conditions.
PESTLE Analysis	Political, economic, social, technological, legal, and environmental factors are taken into consideration while deriving the fluctuations in the growth rate of the market.
Porter's Five Forces Analysis	By understanding the supplier-side and demand-side factors, the current market scenario can be estimated, and future market scenarios predicted, which aid in deriving the growth rate of the market.

3.6 RESEARCH METHODOLOGY FOR MARKET SIZE ESTIMATION

Understanding and penetrating the market in terms of valuation is a crucial task in the process of business research. This again becomes significantly important while investing and choosing business opportunities. In this regard, we at MRFR performs two ways market sizing approach simultaneously, namely top-down and bottom-up approaches. In this step, we place different data points, numeric attributes, information, and industry trends at an appropriate space to deduce the estimates & forecast values over the coming years. We use different mathematical models to estimate the market sizes of different economies and segments. Each of which is further summed up to define the total market.

We at MRFR own a proprietary statistical tool for market estimations which helps us to comprehend market size estimates & forecasts for different markets and industries.

FIGURE 2 BOTTOM-UP AND TOP-DOWN APPROACHES



MRFR Analysis Overview

3.6.1 BOTTOM-UP APPROACH

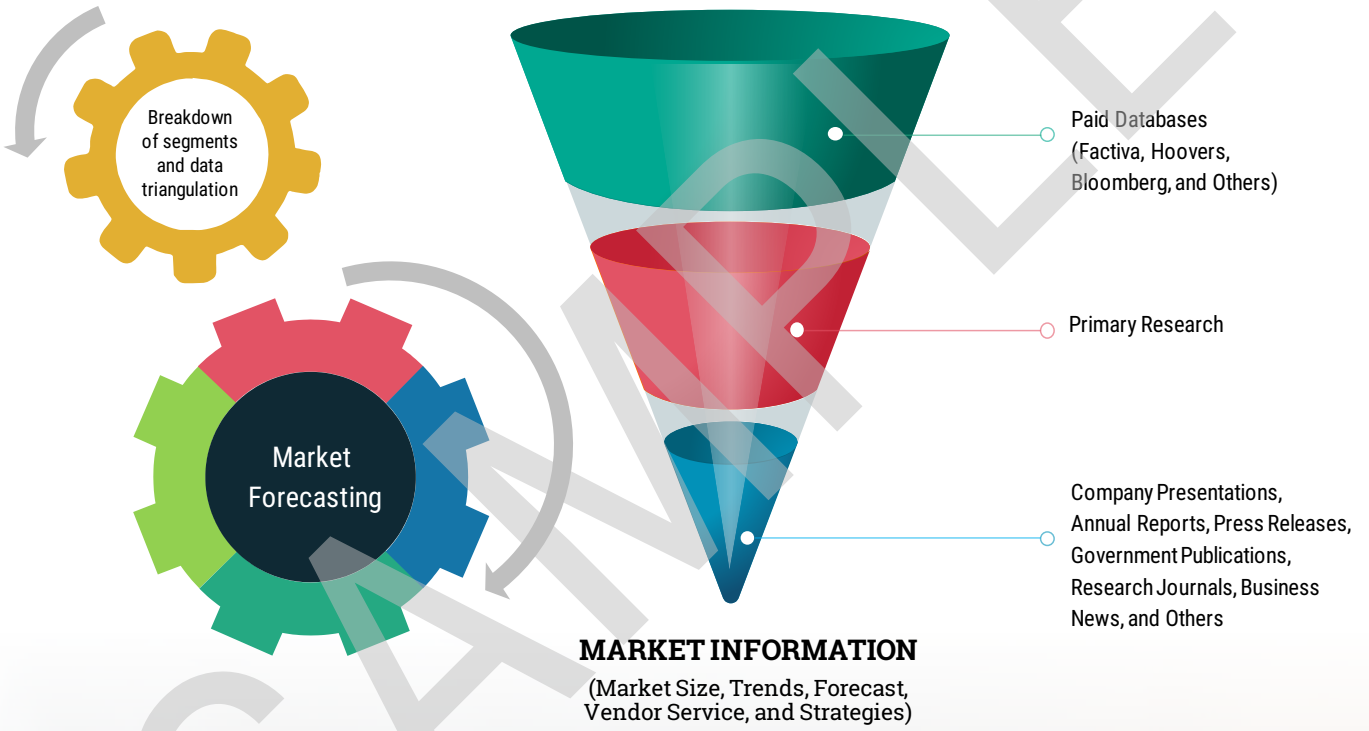
In the bottom-up approach, the revenue of key companies and their shares in the market are assessed to deduce the market size. More than 20 key players operating in the global agricultural biotechnology market are studied. The segmental revenue of each player is analyzed, and the size for the global agricultural biotechnology market is extracted from the segmental/product/service revenue with the help of secondary and primary research. The extracted size for the market is then validated with industry experts and partner consultants. This derived market size contributes to around 65% to 70% of the total global market share in terms of revenue for the agricultural biotechnology market. Using the data triangulation method, the overall global market size is estimated.

3.6.2 TOP-DOWN APPROACH

The overall market size is then used in the top-down procedure to estimate the size of the other sub-markets with the help of percentage splits of the market segments from secondary and primary research. The demand-side analysis is conducted, in which the expenditure of significant industry players in each region is studied. The end-users considered in the scope of this research study contributes around 70% of the total spent in the agricultural biotechnology market.

The countries considered in the scope of the agricultural biotechnology market are the US, Canada, the UK, Germany, France, Italy, Spain, China, Japan, South Korea, India, Australia, South Africa, and others.

The figure below depicts the process of market estimation using independent tools employed by our analysts to arrive at the sizing of the market.



MRFR Analysis Overview

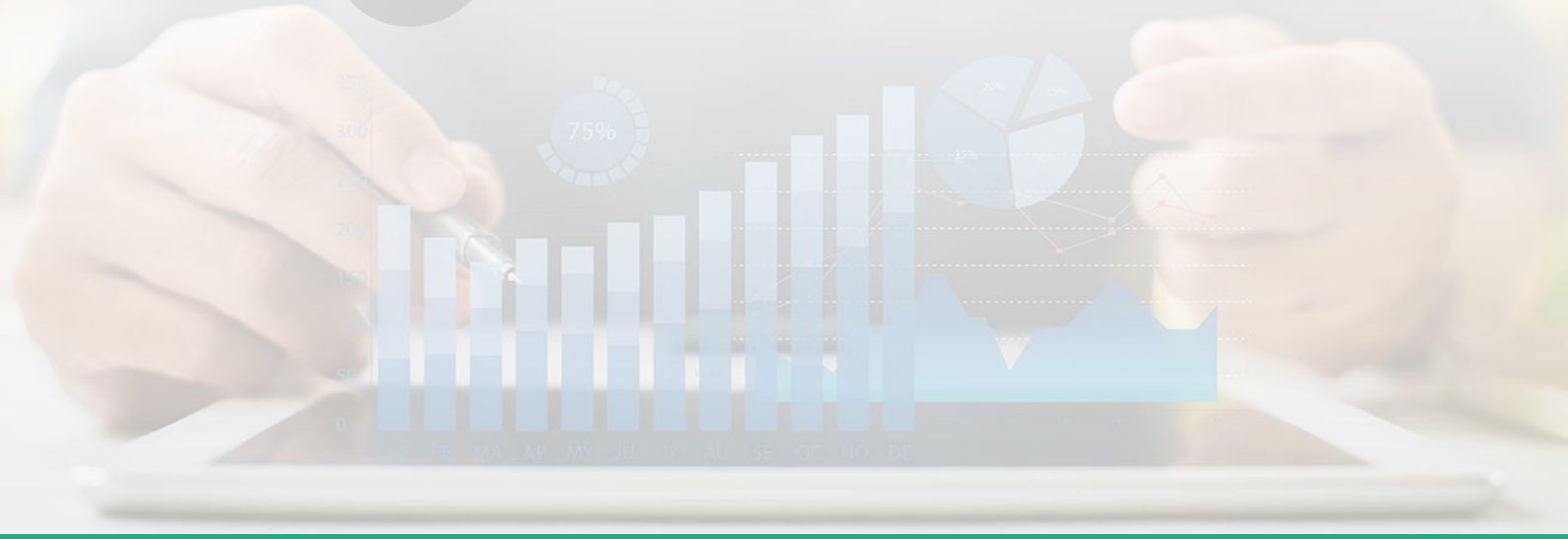
As a part of the market engineering, both top-down and bottom-up approaches are utilized along with data triangulation models to derive and verify the market sizes and forecast over the coming years.

3.7 DATA TRIANGULATION

After arriving at the overall market sizes, the total market is divided into several segments and sub-segments. Again, the market breakdown and data triangulation procedures are implemented, wherever applicable, to complete the overall market engineering process and gather the exact statistics for all segments and sub-segments. The data is triangulated by studying various factors and trends from the demand and supply sides. Along with this, the market size is validated using the top-down and bottom-up approaches.

3.8 VALIDATION

Validation is the most crucial stage of the report making the process. Validation via an intricately designed feedback process helps us finalize the sizing estimates and forecast for the final collation. Extensive primary research is performed to verify the information. This includes telephonic and personal interviews, e-mails, feedback forms, questionnaires, and polling options/answers with a group of relevant industry participants. Validation helps to duly check the authenticity of the key industry trends, market dynamics, company market share, different business models, and conclusions.



4 MARKET DYNAMICS

4.1 OVERVIEW

Agricultural biotechnology is the use of different scientific techniques to modify plants to produce genetically modified plants. Biotechnology plays an important role in increasing resistance of plants towards a disease or any harsh environmental condition and also improving agriculture productivity.

The global agricultural biotechnology market is emerging due to the increasing cultivation of biotech crops across the globe and high investment in agriculture research and development. However, the unfavorable scenario of the cultivation of genetically engineered crops in Europe is hampering the growth of the market

FIGURE 3 MARKET DYNAMICS: ANALYSIS OF THE GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET

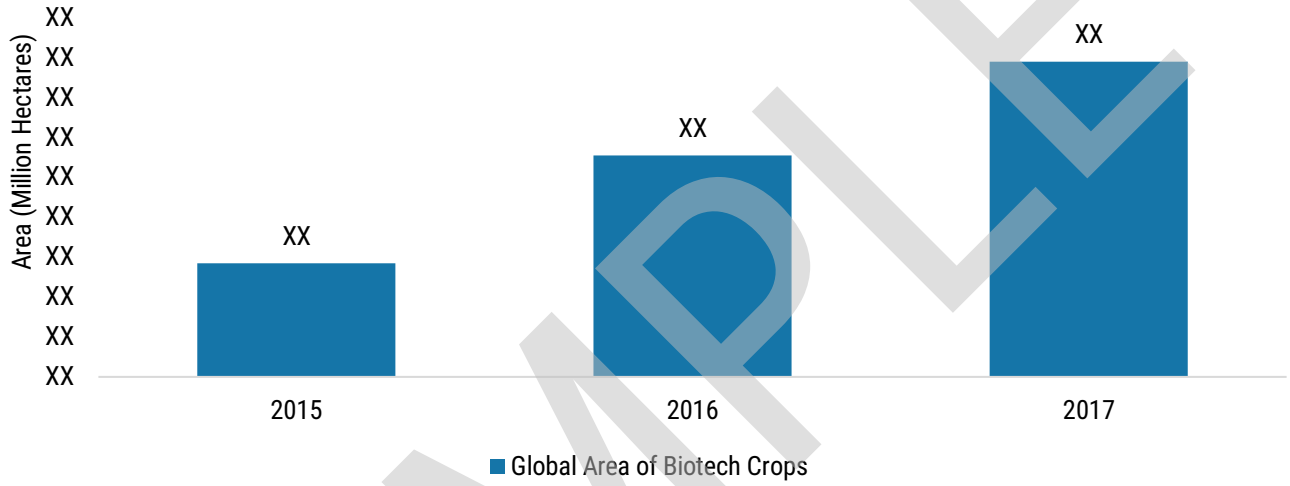
Source: MRFR Analysis

4.2 DRIVERS

4.2.1 INCREASING CULTIVATION OF BIOTECH CROPS ACROSS THE GLOBE

The rapid adoption of biotech crops in industrial and developing countries helps to support the substantial growth of the market. The cultivation of biotech crops is increasing across the globe due to its benefits to the environment and the improvement of economic conditions of farmers. According to the International Service for the Acquisition of Agri-biotech Applications, in 2017, the global area of biotech crops reached XX million hectares compared to XX million hectares in 2016. The increasing cultivation of biotech crops will support the growth of the market during the forecast period.

FIGURE 4 GLOBAL AREA OF BIOTECH CROPS, BY REGION, 2015–2017 (MILLION HECTARES)

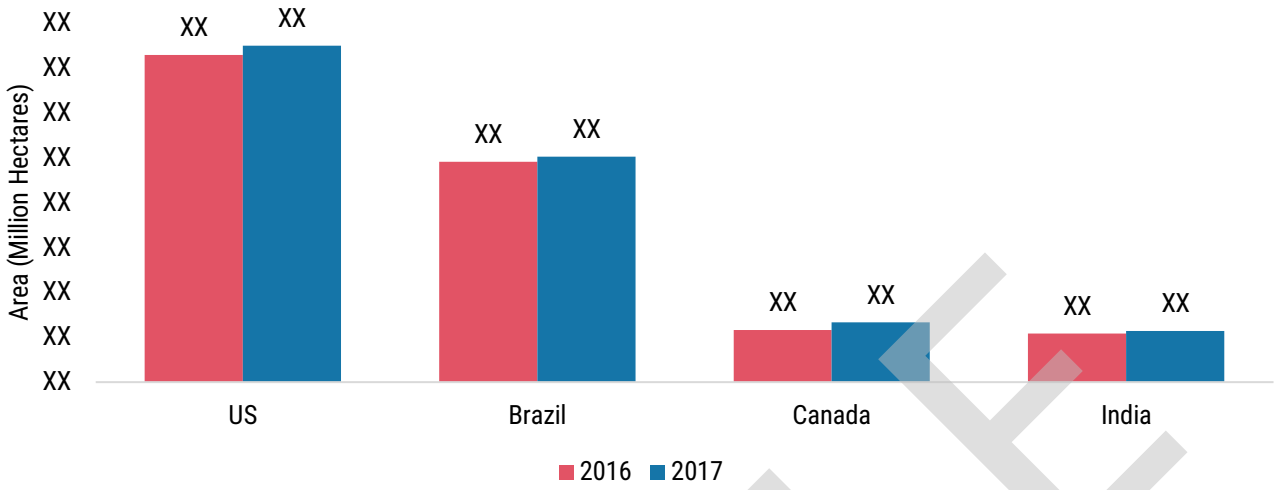


Source: ISAAA, 2017, MRFR Analysis

Several other countries play a major role in the cultivation of biotech crops that helps to support the growth of the market. The US is a leading region in the form of large area of cultivation of biotech plants. As stated by the International Service for the Acquisition of Agri-biotech Applications in 2016, biotech crops in the US were planted in 72.9 million hectares whereas, 70.9 million hectares in 2015. Similarly, in Brazil, biotech crops were planted in 49.1 million hectares in 2016, whereas 44.2 million hectares in 2015. The increasing cultivation of biotech plants will support the growth of the market during forecast period.

Moreover, more than 70 countries adopted the cultivation of biotech crops. The US, Argentina, Canada, Brazil, and India collectively occupied almost XX% of the global biotech crop area. Increasing yields and the increasing availability of food for a large population will support the growth of the market.

FIGURE 5 CULTIVATION AREA OF BIOTECH CROPS, BY COUNTRY, 2016 & 2017 (MILLION HECTARES)



Source: ISAAA, 2017, MRFR Analysis

4.2.2 HIGH INVESTMENT IN AGRICULTURE RESEARCH AND DEVELOPMENT

XXXXXX.

FIGURE 6 DRIVERS IMPACT ANALYSIS

DRIVERS	2016–2017	2018–2019	2020–2027
	IMPACT		
Increasing Cultivation of Biotech Crops Across the Globe			
High Investment in Agriculture Research and Development			

HIGH MEDIUM LOW

Source: MRFR Analysis

4.3 RESTRAINTS

4.3.1 UNFAVORABLE SCENARIO FOR CULTIVATION OF GENETICALLY ENGINEERED CROPS IN EUROPE

The scenario of the cultivation of genetically engineered (GE) crops in Europe is low compared to other regions. The cultivation of GE crops in the European Union (EU) is very limited due to difficult marketing conditions that hamper the cultivation of GE crops in the region. In the Europe Union, the MON810 Bt corn is the only GE plant authorized for cultivation. In 2018, the area planted with Bt corn in Europe decreased by 8% compared to 2017.

Moreover, according to the USDA Foreign Agricultural Service, the EU does not export any GE products, but imports more than 30 million metric tons of soybean products. Unfavorable political and regulatory environments restrict public and private research in biotechnology and are expected to hinder the growth of the EU agricultural biotechnology market.

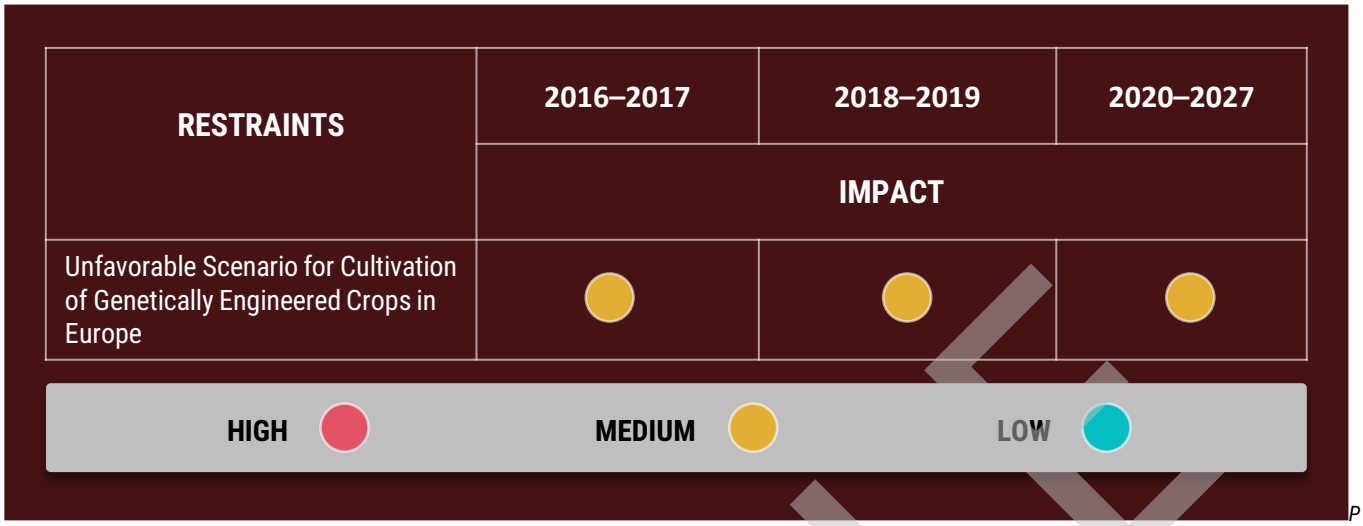
EU has permitted individual countries to decide to allow farmers from growing genetically modified organism (GMO) crops. Many countries in the EU banned or prohibited the cultivation of GMO crops, including Austria, Denmark, Germany, Russia, and Switzerland, among others. The below list of countries banned or prohibited the cultivation of GMO crops.

TABLE 3 COUNTRY SCENARIO OF GENETICALLY MODIFIED ORGANISM (GMO) CROPS PROHIBITION

Country	Cultivation	Import
Austria	Banned	Allowed
Denmark	Prohibited	Banned
Germany	Prohibited	Banned
Netherlands	Prohibited	Allowed
France	Prohibited	Allowed
Russia	Banned	Allowed
Saudi Arabia	Banned	Allowed
Switzerland	Banned	Allowed
Zimbabwe	Banned	Banned
Turkey	Banned	Allowed
Ukraine	Banned	Allowed
Norway	Prohibited	Allowed
Poland	Prohibited	Allowed

Source: MRFR Analysis

FIGURE 7 RESTRAINT IMPACT ANALYSIS



Source: MRFR Analysis

4.4 OPPORTUNITIES

4.4.1 ENTERING DEVELOPING ECONOMIES

XXXXXX.

4.5 COVID 19 IMPACT ANALYSIS

4.5.1 IMPACT ON MARKETING

XXXXX

4.5.2 IMPACT ON DEMAND

XXXX

4.5.3 IMPACT ON SUPPLY CHAIN

XXXX

4.5.4 IMPACT ON KEY PLAYER

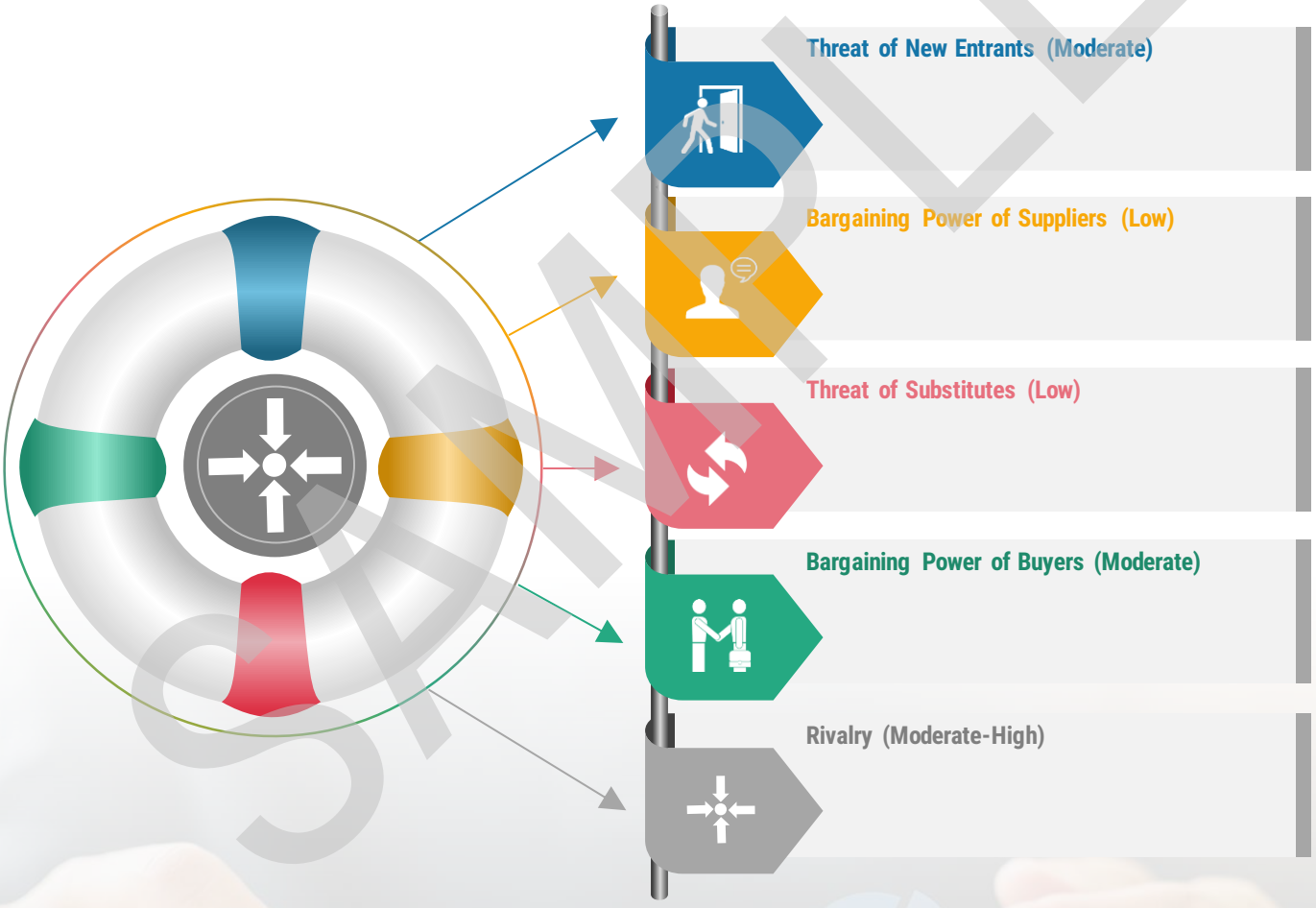
XXXX

5 MARKET FACTOR ANALYSIS

5.1 PORTER'S FIVE FORCES MODEL

Michael Porter's five forces model gives a framework of the influence of five forces on the global agricultural biotechnology market. Strategic business managers, trying to create an edge over competing firms in the global agricultural biotechnology market, can utilize this model to comprehend better the industry connection in which the firm operates. The components of each of the forces and the degree or impact of each component in the context of the global agricultural biotechnology industry have been broken down and analyzed below.

FIGURE 8 PORTER'S FIVE FORCES ANALYSIS: GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET



Source: MRFR Analysis

5.1.1 THREAT OF NEW ENTRANTS

The threat of new entrants is moderate in the global agricultural biotechnology market. Any manufacturing company trying to enter the market is required to accept or abide by the regulatory standards. However, the budget required for research and development of GM crops is medium compared to the other industries. Moreover, if a company desires to survive in the market, it must introduce innovative products in the market. The presence of huge opportunities in the market has increased the threat of new entrants to the market.

5.1.2 BARGAINING POWER OF SUPPLIERS

The bargaining power of suppliers in the agricultural biotechnology market is low. In this market, the suppliers are the manufacturers of genetically modified (GM) crops. The market has the presence of many local and international companies that supply raw material for agricultural biotechnology. Furthermore, increasing demand from research institutes and entry of multinational agricultural biotechnology companies in the market is further expected to keep the bargaining power of suppliers low. The presence of large number of suppliers would cater to the needs of the customers which will lead to intense competition between the existing suppliers which thereby keep the bargaining power of suppliers low.

5.1.3 THREAT OF SUBSTITUTES

The threat of substitutes in the global agricultural biotechnology market is moderate. Any threat from a close substitute product is measured to have a high impact on the market. The threat of substitutes arises when the buyers or the customers in the market can accomplish the end-result using other similar products. Although there is a medium number of replacements or the presence of alternative products in the market, which eliminates the threat of substitute.

5.1.4 BARGAINING POWER OF BUYERS

The bargaining power of buyers is moderate in the global agricultural biotechnology market. The farmers utilizing GM crops and seeds are the buyers of the market. The number of buyers in the market is rising due to the high income from the GM crops for the buyers. Besides, the pricing factor also plays a vital role in the bargaining power of buyers in the market as some buyers are price and brand sensitive and might prefer particular products from certain companies.

5.1.5 INTENSITY OF RIVALRY

The degree of competition in the global agricultural biotechnology market is moderate to high. The moderate degree of product differentiation among existing players increases the intensity of rivalry in the market. Companies involved in the market are trying to develop cost-effective products to make product differentiation. To overcome the competition, players are engaged in developing a process to lower their manufacturing costs. Moreover, the players are also developing advanced techniques for differentiating their products from their rivals, which encourages competition to gain maximum market share.

5.2 VALUE CHAIN ANALYSIS

The global agricultural biotechnology market is growing at a steady rate and is expected to upsurge in the near future. This is due to the increasing cultivation of biotech crops. The value chain analysis for the global agricultural biotechnology market comprises of four major components which start with the research and product development followed by manufacturing of the products, distribution, sales, and ends with post-sales services.

FIGURE 9 VALUE CHAIN ANALYSIS OF THE GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET

Source: MRFR Analysis

5.2.1 R&D

XXXXXX.

5.2.2 RAW MATERIAL PROCUREMENT

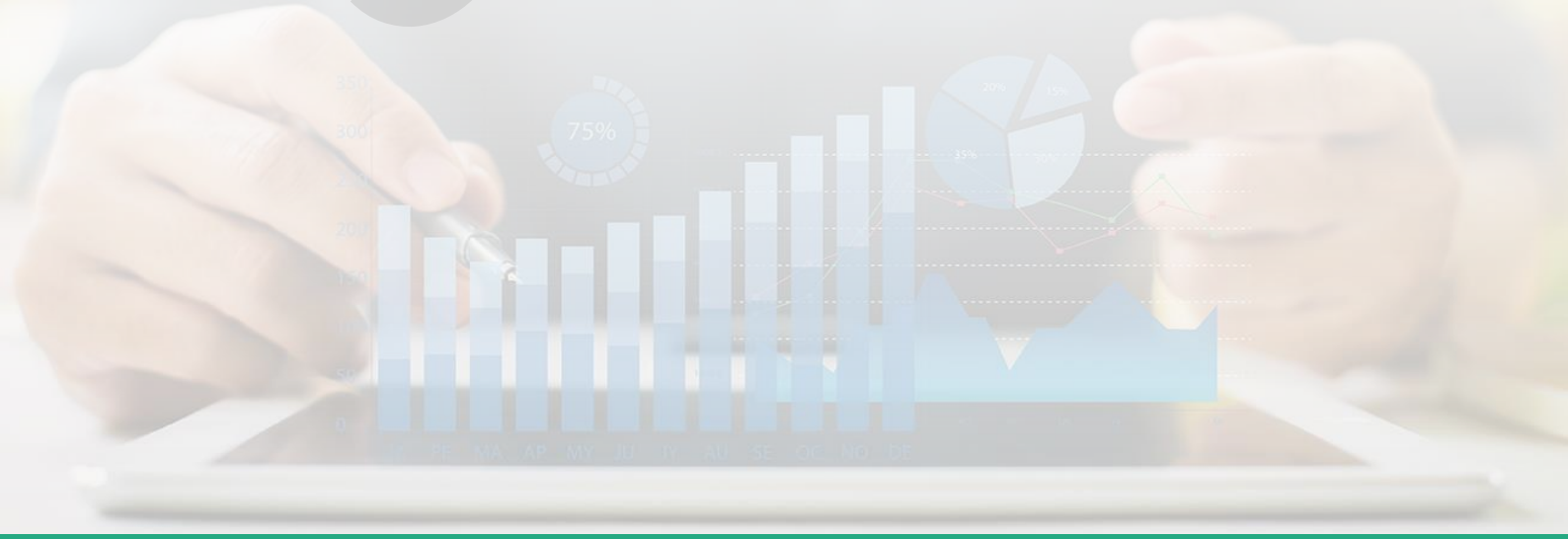
XXXXXX.

5.2.3 PROCESSING

XXXXXX.

5.2.4 PACKAGING

XXXXXX.



6 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY CROP TYPE

6.1 INTRODUCTION

With the rate of adoption of genetically modified (GM) products and an increase in amount of land area dedicated to growing GM crops, it has been claimed that this technology has been the fastest adopted agricultural technique in modern history. Based on crop type, the global agricultural biotechnology market has been classified as corn, soybean, cotton, maize, and other crops.

Bt maize is created by inserting a gene of Bacillus thuringiensis, which causes the plant to produce the toxin and become insect resistant. Transgenic maize was first commercialized in the US and Canada in 1996 and two years later in Argentina, South Africa, and Spain. The Bt maize segment held a market share of XX% in 2019 owing to the increasing demand for genetically modified products. Moreover, in the European Union (EU), the only genetically modified (GM) maize trait is authorized for planting. In 2018, 121,132 ha of GM maize was planted in Spain and Portugal. Bt maize varieties specifically protect against Lepidopteran and Coleopteran insect pests.

The cotton segment accounted for the market share of XX% in the global agricultural biotechnology market. The shortage of food in some countries and rising awareness about the benefits associated with GM cotton are strongly boosting the growth of this segment. As per the 2018 study published in the Global Food Security journal, in India, the use of Bt cotton increased farmers' profit by 50% and reduced food insecurity by 15% to 20%.

The soybean segment is expected to register a CAGR of XX% during the assessment period. Soybean has become a popular subject of genetic modification over the past two decades, and with the advancement of plant transformation technology, it is now possible to add various traits to soybean. Some of the common methods of plant transformation include electroporation, silicon carbide fibers, liposome-mediated transformation, and in planta Agrobacterium-mediated transformation. Argentina is the third-largest producer of GM crops in the world and planted 18.7 million hectares biotech soybean in 2016.

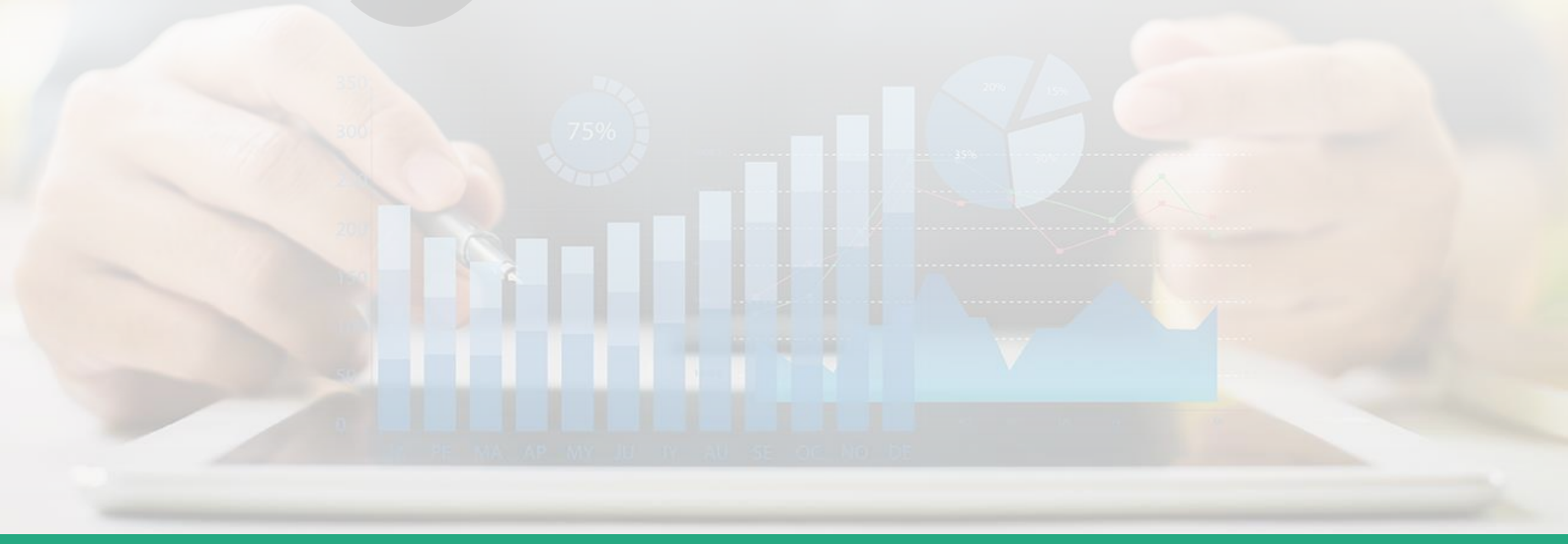


FIGURE 10 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY CROP TYPE 2019 & 2027 (USD MILLION)

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 4 GLOBAL AGRICUTURAL BIOTECHNOLOGY MARKET, BY CROP TYPE 2017-2027 (USD MILLION)

Crop Type	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Soybean	XX	XX	XX	XX	XX	XX
Maize	XX	XX	XX	XX	XX	XX
Cotton	XX	XX	XX	XX	XX	XX
Other Crops	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

6.2 SOYBEAN

TABLE 5 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR SOYBEAN, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

6.3 MAIZE

TABLE 6 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR MAIZE, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

6.4 COTTON

TABLE 7 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR MEDIUMTHROUGHPUT, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

6.5 OTHER CROPS

TABLE 8 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR OTHER CROPS, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

7 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY APPLICATION

7.1 INTRODUCTION

Agricultural biotechnology is one of the expanding industries in the world that will continue to offer remarkable economic, environmental, and social opportunities in the years ahead.

The rising awareness about the benefits associated with the biotechnology-derived crops is strongly motivating the researchers and market players to expand the application areas of agricultural biotechnology. Agricultural biotechnology can make production cheaper and more manageable, which can further assist developing countries to keep pace with demands for food while reducing production costs. Apart from production enhancement, advances in biotechnology are also helpful in developing herbicide-tolerant, insect resistant, and nutritionally enriched crops.

The growth in the adoption of genetically modified/biotech crops, technological advancements, and increasing government support in the production and commercialization of biotechnology-derived crops are also impacting the growth of the market.

Based on application, the global agricultural biotechnology market has been classified as herbicide tolerance, insect tolerance, stacked traits, and others.

The herbicide tolerance segment dominated the global agricultural biotechnology market by application and has a market share of XX% owing to the increasing use of herbicides for weed control. Glyphosate is an active ingredient in many herbicides sold throughout the world. The increased use of glyphosate has various long-term chronic effects such as birth defects, endocrine disruption, and others. Currently, the only varieties cultivated in the US are engineered to be tolerant to glyphosate. However, the USFDA is currently in the process of deregulating other new varieties of crops that are resistant to 2,4-D and other herbicides.

Herbicide tolerance and insect tolerance traits represent more than 99% of the demand in the agricultural biotechnology industry. Genetically engineered soybean, maize, canola, and cotton are the most common examples of these crops in the market. Developing countries such as India and China are the largest producers of genetically modified Bt cotton. A major example of genetically engineered insect resistance is the transfer of a gene coding for a Cry protein from the soil bacterium Bt to the plant (these Cry proteins are also called Bt toxins).

Gene stacking refers to the process of combining two or more genes of interest into a single plant. The combined traits resulting from this process are called stacked traits.

FIGURE 11 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY APPLICATION 2019 & 2027 (USD MILLION)

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 9 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY APPLICATION 2017-2027 (USD MILLION)

Application	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Herbicide Tolerance	XX	XX	XX	XX	XX	XX
Stacked Traits	XX	XX	XX	XX	XX	XX
Insect Tolerance	XX	XX	XX	XX	XX	XX
Other Crops	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

7.2 HERBICIDE TOLERANCE

TABLE 10 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR HERBICIDE TOLERANCE, BY APPLICATIONS TYPES 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

7.3 STACKED TRAITS

TABLE 11 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR STACKED TRAITS, BY APPLICATIONS TYPES 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

7.4 INSECT TOLERANCE

TABLE 12 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR INSECT TOLERANCE, BY APPLICATIONS TYPES 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

7.5 OTHER CROPS

TABLE 13 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR OTHER CROPS, BY APPLICATIONS TYPES 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

8 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY TECHNIQUE

8.1 INTRODUCTION

Agricultural biotechnology is the use of different techniques to modify plants with desirable characteristics.

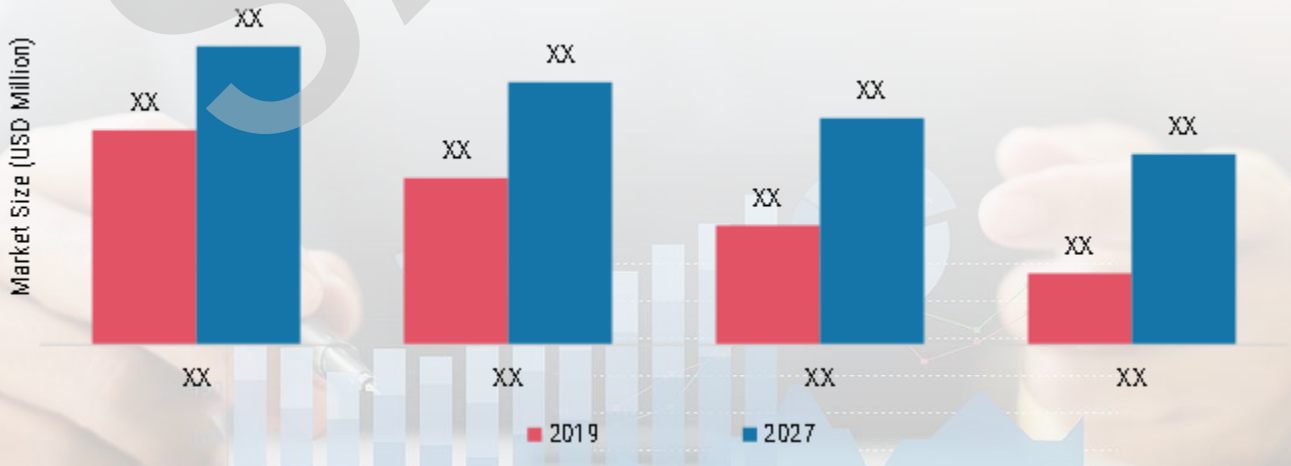
Based on technique, the global agricultural biotechnology market has been classified as genetic engineering, molecular breeding, molecular diagnostics, and tissue culture.

Genetic engineering is a process that allows the transfer of a useful characteristic into an organism by inserting it with a gene containing the particular trait. This process is specifically used to increase productivity and resistance to weeds and harsh weather conditions. The genetic engineering segment held the largest market share of XX% in 2019 due to the rising demand for genetically engineered crops and favorable political and regulatory environment for the cultivation of genetically engineered products.

The molecular breeding segment accounted for the market share of XX% in the global agricultural biotechnology market in 2019. This technique involves examining the DNA of an organism to select molecular markers with desirable traits. With the use of molecular markers, breeding has been made more precise and accurate, and this has countered the undesirable characteristics that may have appeared in future generations.

Molecular diagnostics are used in agriculture to more accurately diagnose crop diseases. Crop diseases can be caused by different types of fungi, bacteria, phytoplasma, viruses, viroid, nematodes, and other agents. The tissue culturing technique is used to produce a plant that is free of undesirable characteristics and diseases. In the process, a disease-free plant part is used for further culturing. The different types of plants in which tissue culture works include bananas, avocados, mangoes, coffee, and papaya, among others.

FIGURE 12 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY TECHNIQUE 2019 & 2027 (USD MILLION)



Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 14 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY TECHNIQUE 2017-2027 (USD MILLION)

Technique	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Genetic Engineering	XX	XX	XX	XX	XX	XX
Molecular Breeding	XX	XX	XX	XX	XX	XX
Molecular Diagnostics	XX	XX	XX	XX	XX	XX
Tissue culture	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

8.2 GENETIC ENGINEERING

TABLE 15 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR GENETIC ENGINEERING, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

8.3 MOLECULAR BREEDING

TABLE 16 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR MOLECULAR BREEDING, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

8.4 MOLECULAR DIAGNOSTICS

TABLE 17 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR MOLECULAR DIAGNOSTICS, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

8.5 TISSUE CULTURE

TABLE 18 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, FOR TISSUE CULTURE, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX
Asia-Pacific	XX	XX	XX	XX	XX	XX
Europe	XX	XX	XX	XX	XX	XX
Middle East & Africa	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

9 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY REGION

9.1 INTRODUCTION

Based on region, the global agricultural biotechnology market has been segmented into the Americas, Europe, Asia-Pacific, and the Middle East & Africa. The agricultural biotechnology market in the Americas has been segmented into North America and Latin America. The North America market is further divided into the US and Canada, whereas Latin America is further classified as Brazil, Mexico, and Argentina.

In 2019, the Americas accounted for the largest market share of XX% in the global agricultural biotechnology market. This share is primarily attributed to the continuous growth in the adoption of biotech crops in this region. As per the 2017 study published by the International Service for the Acquisition of Agri-biotech Applications (ISAAA), the US was the top producer of biotech crops globally, which planted crops in 75 million hectares in 2017, covering 40% of the global biotech crop plantings. Brazil held the second-largest position, with 50.2 million hectares or 26% of the global output. The study has also suggested that in the same year, farmers in the US planted 1.14 million hectares of herbicide-tolerant alfalfa and 80,000 hectares of low lignin alfalfa, while farmers in Canada planted 3,000 hectares low lignin alfalfa.

The agricultural biotechnology market in Asia-Pacific has been segmented into China, India, Japan, New Zealand, Australia, and the rest of Asia-Pacific. The major factors influencing the growth of the market in this region include the high production of biotech crops, favorable government initiatives for agricultural biotechnology research, and raising awareness about the benefits associated with genetically modified crops. According to the 2017 report published by the International Service for the Acquisition of Agri-biotech Applications (ISAAA), India planted 11.4 million hectares of biotech crop in 2017 which was a 5.6% increase from 10.8 million hectares in 2016.

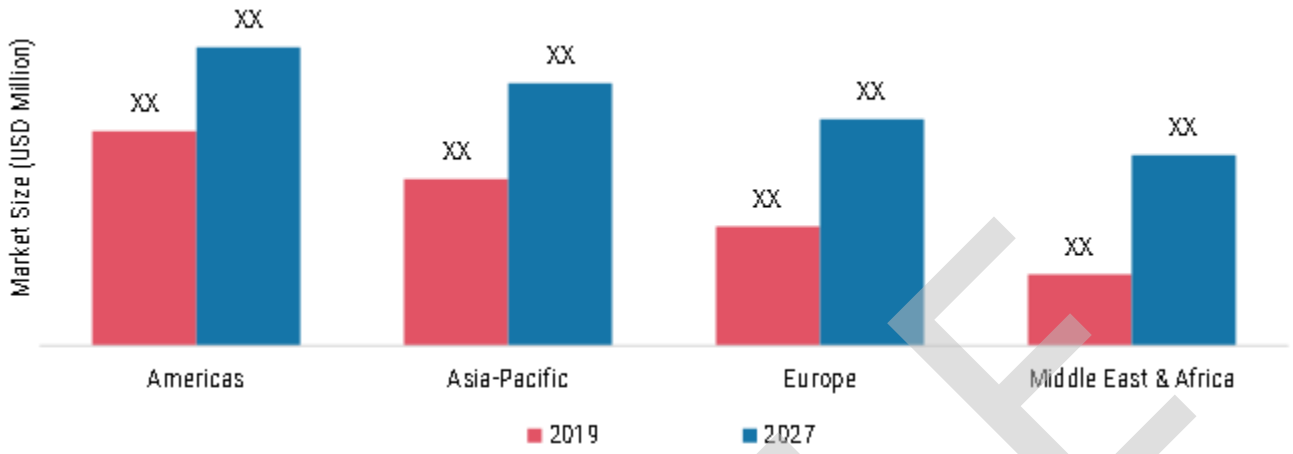
The European agricultural biotechnology market has been segmented into Western Europe and Eastern Europe. The Western Europe agricultural biotechnology market has further been classified as Germany, France, the UK, Italy, Spain, and the rest of Western Europe.

The Europe agricultural biotechnology market is the third-largest market, with a market share of XX%. As per the information suggested by The Canadian Biotechnology Action Network (CBAN), the only genetically engineered crop currently grown in Europe is Monsanto's insect-resistant (Bt) corn. According to the 2018 annual report published by the USDA Foreign Agricultural Service, Europe does not export any genetically engineered products, but it imports more than 30 million metric tons of soybean products, 2.5 to 4.5 million metric tons of rapeseed products, and 10 to 15 million metric tons of corn products, per year, mainly for feed.

The difficult marketing conditions and threat of destruction by activists mainly discourage the cultivation of genetically engineered crops in this region. However, the situation is a little different in a few countries. The UK and Spain are examples of genetically engineered-labeled imported food products that achieve sales success.

The agricultural biotechnology market in the Middle East & Africa has been segmented into the Middle East and Africa. Globally, the rising adoption of genetically engineered food products is propelling the growth of the agricultural biotechnology market. Kuwait, Oman, Qatar, and the UAE are the major importers of genetically engineered food products.

FIGURE 13 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET SHARE, BY REGION 2019 & 2027 (USD MILLION)



Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 19 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, BY REGION 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Americas	XX	XX	XX	XX	XX	XX%
Asia-Pacific	XX	XX	XX	XX	XX	XX%
Europe	XX	XX	XX	XX	XX	XX%
Middle East & Africa	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

9.2 AMERICAS

TABLE 20 AMERICAS: AGRICULTURAL BIOTECHNOLOGY MARKET, BY REGION, 2017-2027 (USD MILLION)

Region	2017	2018	2019	2020	2027	CAGR % (2020–2027)
North America	XX	XX	XX	XX	XX	XX%
Latin America	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 21 AMERICAS: AGRICULTURAL BIOTECHNOLOGY MARKET, BY CROP TYPE, 2017-2027 (USD MILLION)

Crop Type	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Soybean	XX	XX	XX	XX	XX	XX%
Maize	XX	XX	XX	XX	XX	XX%
Cotton	XX	XX	XX	XX	XX	XX%
Other Crops	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

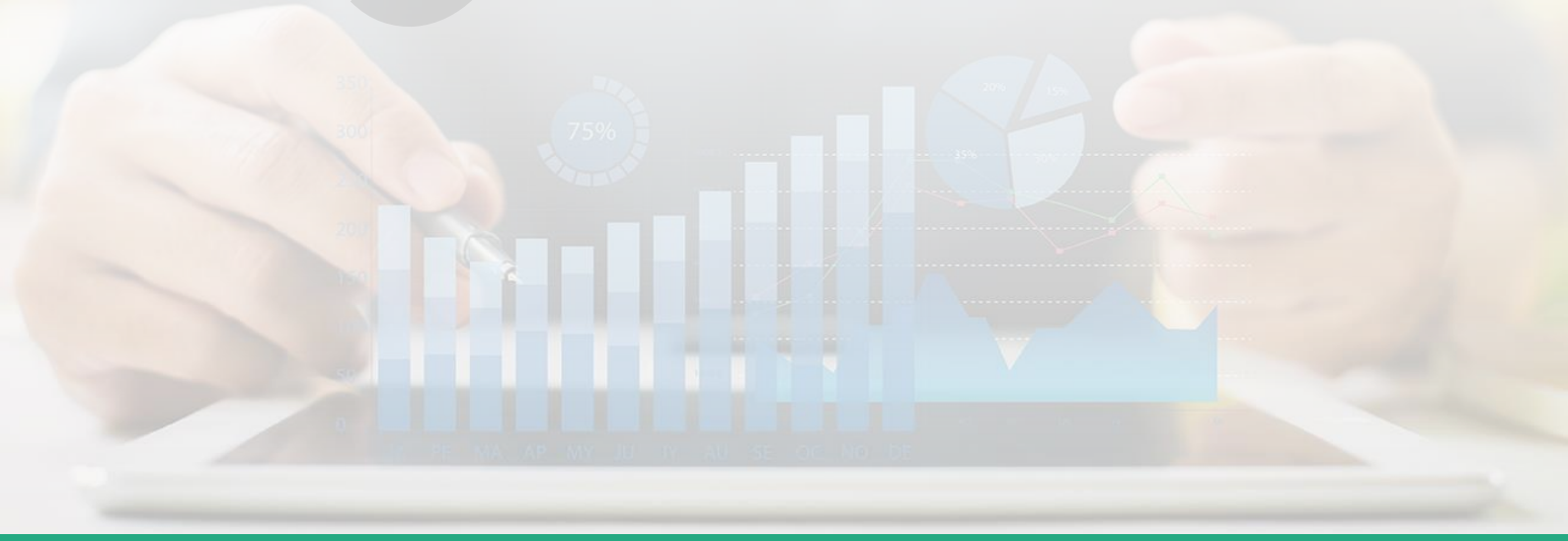


TABLE 22 AMERICAS: AGRICULTURAL BIOTECHNOLOGY MARKET, BY APPLICATION, 2017-2027 (USD MILLION)

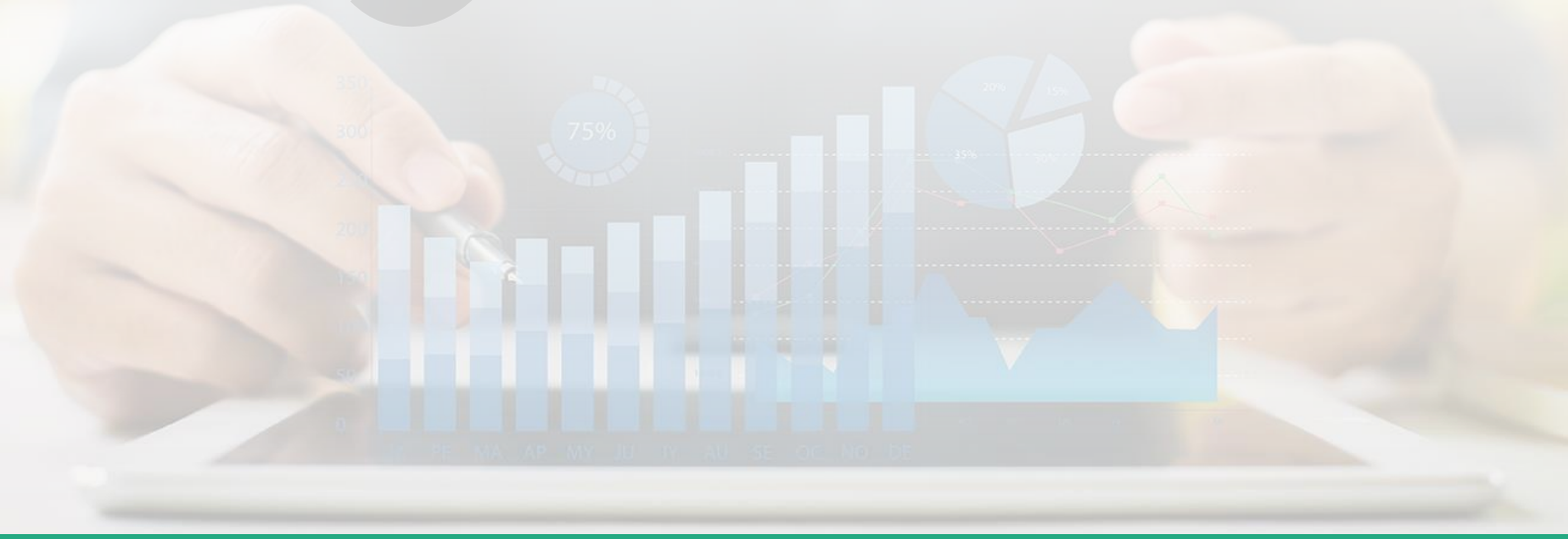
Application	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Herbicide Tolerance	XX	XX	XX	XX	XX	XX%
Stacked Traits	XX	XX	XX	XX	XX	XX%
Insect Tolerance	XX	XX	XX	XX	XX	XX%
Other Crops	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 23 AMERICAS: AGRICULTURAL BIOTECHNOLOGY MARKET, BY TECHNIQUE, 2017-2027 (USD MILLION)

Technique	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Genetic Engineering	XX	XX	XX	XX	XX	XX%
Molecular Breeding	XX	XX	XX	XX	XX	XX%
Molecular Diagnostics	XX	XX	XX	XX	XX	XX%
Tissue culture	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis



9.2.1 NORTH AMERICA

TABLE 24 NORTH AMERICA: AGRICULTURAL BIOTECHNOLOGY MARKET, BY COUNTRY, 2017-2027 (USD MILLION)

Country	2017	2018	2019	2020	2027	CAGR % (2020–2027)
US	XX	XX	XX	XX	XX	XX%
Canada	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 25 NORTH AMERICA: AGRICULTURAL BIOTECHNOLOGY MARKET, BY CROP TYPE, 2017-2027 (USD MILLION)

Crop Type	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Soybean	XX	XX	XX	XX	XX	XX%
Maize	XX	XX	XX	XX	XX	XX%
Cotton	XX	XX	XX	XX	XX	XX%
Other Crops	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

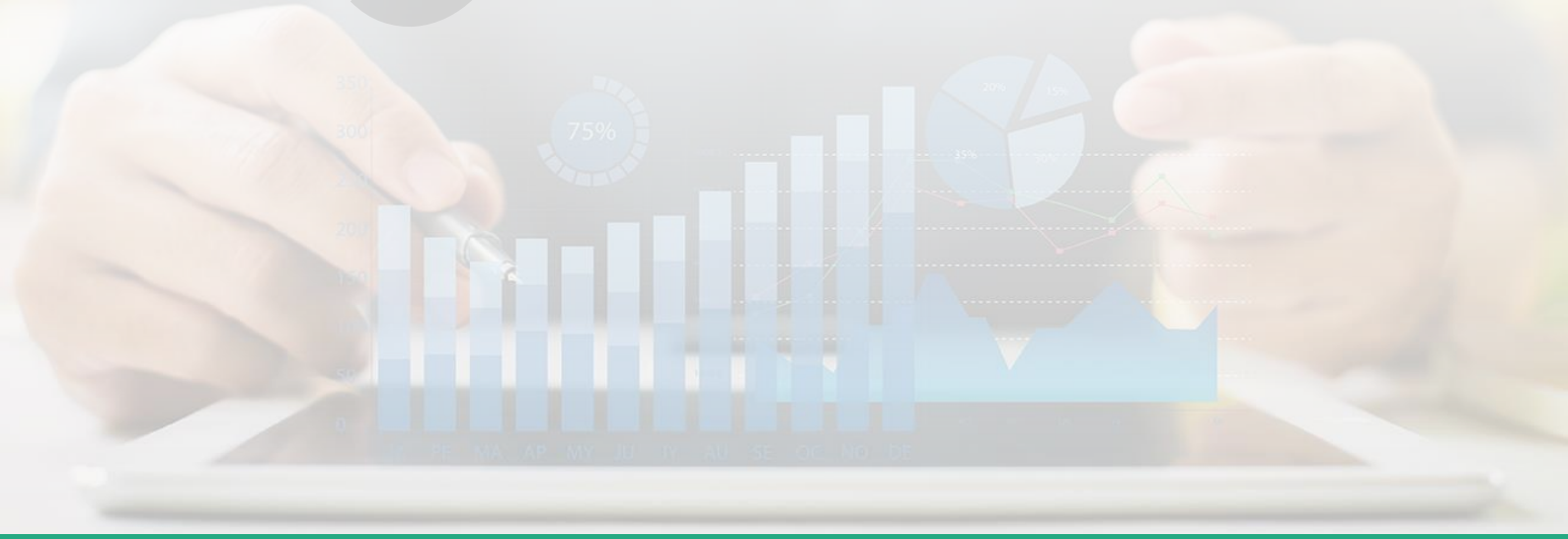


TABLE 26 NORTH AMERICA: AGRICULTURAL BIOTECHNOLOGY MARKET, BY APPLICATION, 2017-2027 (USD MILLION)

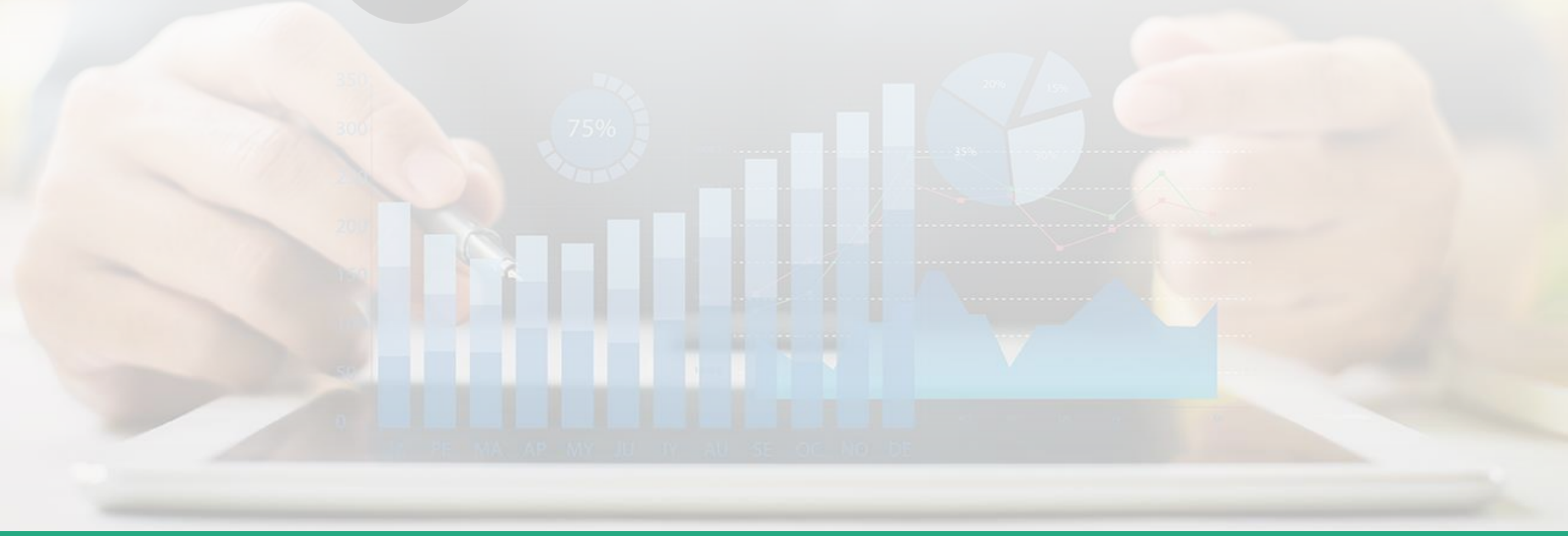
Application	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Herbicide Tolerance	XX	XX	XX	XX	XX	XX%
Stacked Traits	XX	XX	XX	XX	XX	XX%
Insect Tolerance	XX	XX	XX	XX	XX	XX%
Other Crops	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 27 NORTH AMERICA: AGRICULTURAL BIOTECHNOLOGY MARKET, BY TECHNIQUE, 2017-2027 (USD MILLION)

Technique	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Genetic Engineering	XX	XX	XX	XX	XX	XX%
Molecular Breeding	XX	XX	XX	XX	XX	XX%
Molecular Diagnostics	XX	XX	XX	XX	XX	XX%
Tissue culture	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis



9.2.1.1 US

TABLE 28 US: AGRICULTURAL BIOTECHNOLOGY MARKET, BY CROP TYPE, 2017-2027 (USD MILLION)

Crop Type	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Soybean	XX	XX	XX	XX	XX	XX%
Maize	XX	XX	XX	XX	XX	XX%
Cotton	XX	XX	XX	XX	XX	XX%
Other Crops	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 29 US: AGRICULTURAL BIOTECHNOLOGY MARKET, BY APPLICATION, 2017-2027 (USD MILLION)

Application	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Herbicide Tolerance	XX	XX	XX	XX	XX	XX%
Stacked Traits	XX	XX	XX	XX	XX	XX%
Insect Tolerance	XX	XX	XX	XX	XX	XX%
Other Crops	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

TABLE 30 US: AGRICULTURAL BIOTECHNOLOGY MARKET, BY TECHNIQUE, 2017-2027 (USD MILLION)

Technique	2017	2018	2019	2020	2027	CAGR % (2020–2027)
Genetic Engineering	XX	XX	XX	XX	XX	XX%
Molecular Breeding	XX	XX	XX	XX	XX	XX%
Molecular Diagnostics	XX	XX	XX	XX	XX	XX%
Tissue culture	XX	XX	XX	XX	XX	XX%
Total	XX	XX	XX	XX	XX	XX%

Sources: International Service for the Acquisition of Agri-biotech Applications, United States Department of Agriculture, Biotechnology Innovation Organization, Agricultural Biotechnology Council, National Center for Biotechnology Information (NCBI), World Health Organization (WHO), Annual Reports, Research Journals, White Papers, Corporate Presentations, Company Websites, and MRFR Analysis

10 COMPETITIVE LANDSCAPE

10.1 OVERVIEW

The global agricultural biotechnology market consists of a large number of manufacturers and increasing competition in the market. Americas and Asia-Pacific are hubs for major companies that have been generating maximum market share which has turned these regions into developed markets for agricultural biotechnology. These companies have expanded their distribution units in various other regions as well. Moreover, there are other small- and medium-scale players that generate revenue from local markets.

10.2 MAJOR COMPANIES

There are numerous players operating in this market all over the globe. Most of these players exist in the American and Asia-Pacific region. There are a huge number of medium and small market players operating in the market which offers agricultural biotechnological products and thus the market shares of these players are much differentiated.

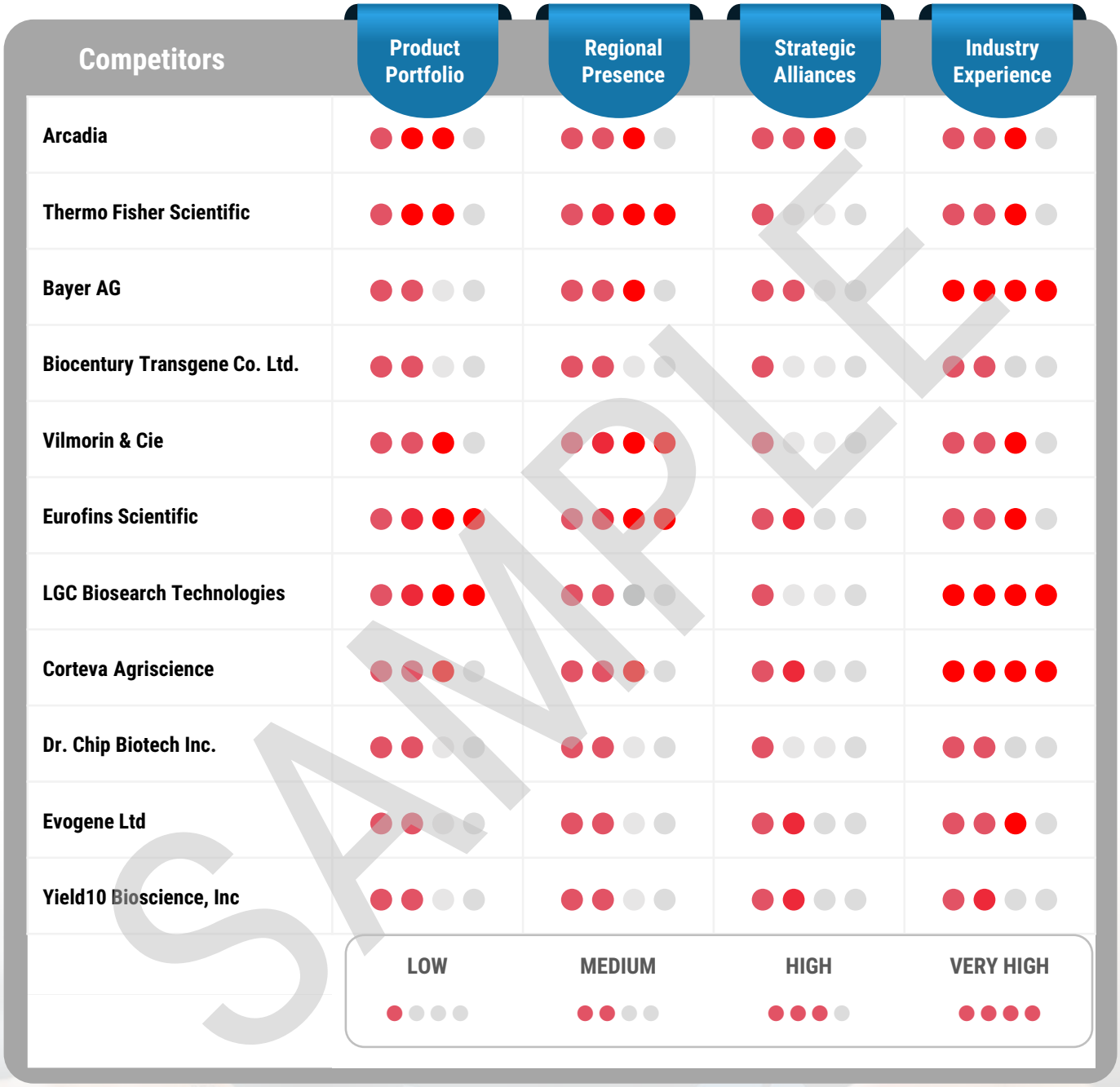
TABLE 31 MAJOR MANUFACTURERS IN THE GLOBAL AGRICULTURAL BIOTECHNOLOGICAL MARKET

Sr. No.	Company
1	XXXX
2	XXXX
3	XXXX
4	XXXX
5	XXXX

XXXXXXXXXXXXXXX.

10.3 COMPETITIVE BENCHMARKING

FIGURE 14 BENCHMARKING OF MAJOR COMPETITORS



Source: Annual Report, Press releases, Secondary Research, and Market Research Future Analysis

10.4 COMPETITOR DASHBOARD

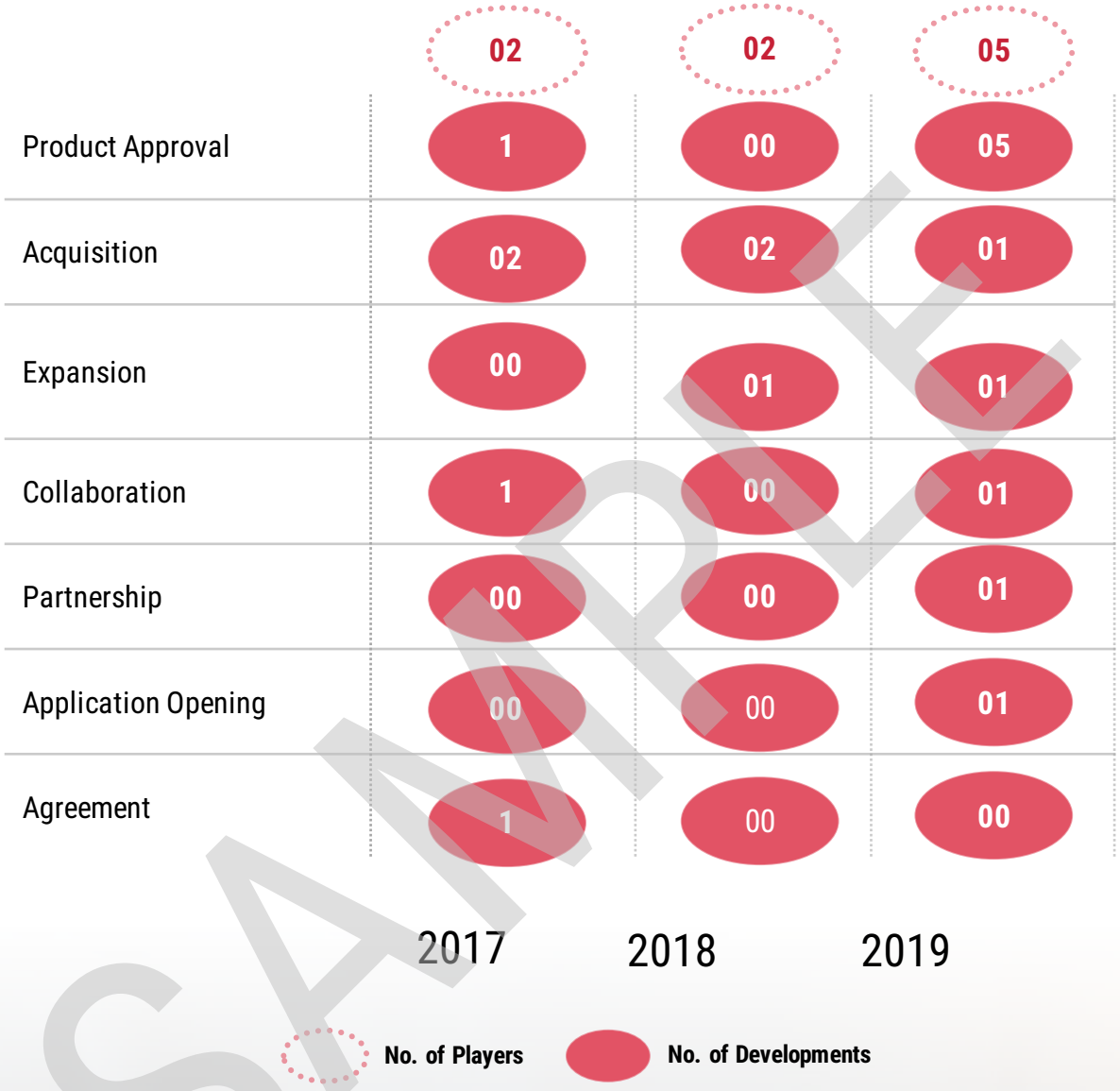
FIGURE 15 COMPETITOR DASHBOARD: GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET

COMPANY NAME	GEOGRAPHY			
	Americas	Europe	Asia-Pacific	Middle East & Africa
Arcadia	XX	XX	XX	XX
Thermo Fisher Scientific	XX	XX	XX	XX
Bayer AG	XX	XX	XX	XX
Biocentury Transgene Co. Ltd.	XX	XX	XX	XX
Vilmorin & Cie	XX	XX	XX	XX
Eurofins Scientific	XX	XX	XX	XX
LGC Biosearch Technologies	XX	XX	XX	XX
Corteva Agriscience	XX	XX	XX	XX
Dr. Chip Biotech Inc.	XX	XX	XX	XX
Evogene Ltd	XX	XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.5 MAJOR GROWTH STRATEGY IN THE GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET

FIGURE 16 MAJOR STRATEGY ADOPTED BY KEY PLAYERS IN THE AGRICULTURAL BIOTECHNOLOGY MARKET



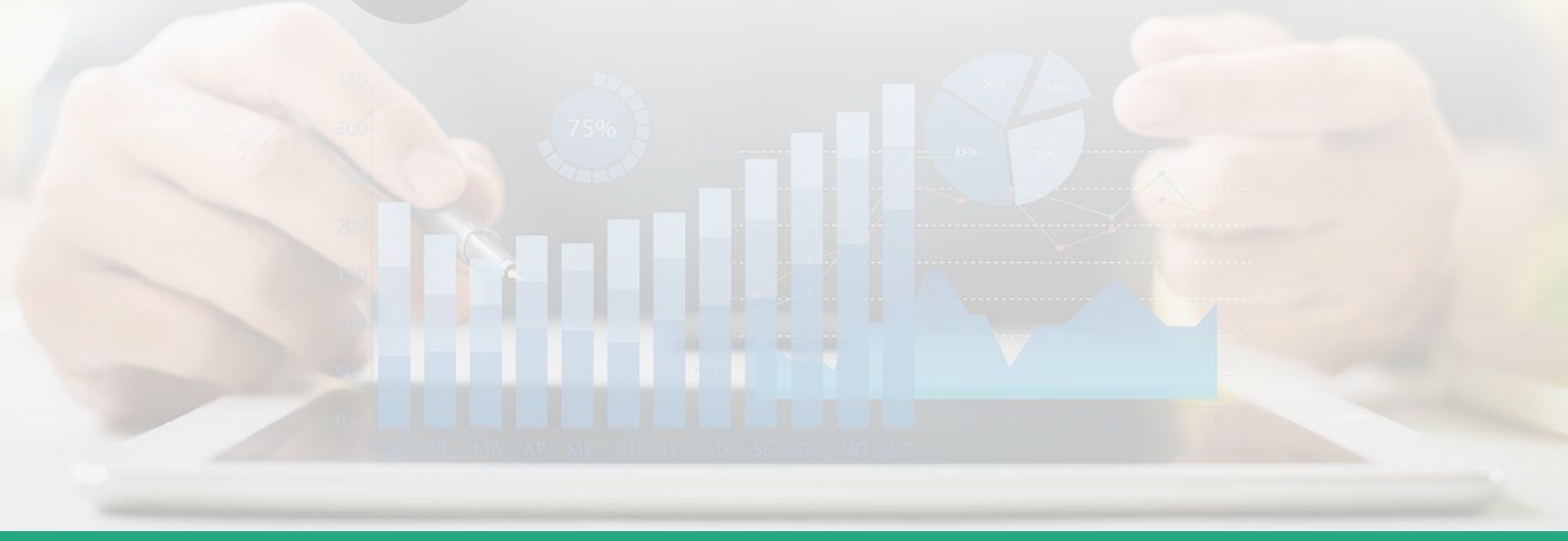
Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.6 THE LEADING PLAYER IN TERMS OF NUMBER OF DEVELOPMENTS IN GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET

TABLE 32 THE MOST ACTIVE PLAYER IN THE GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET

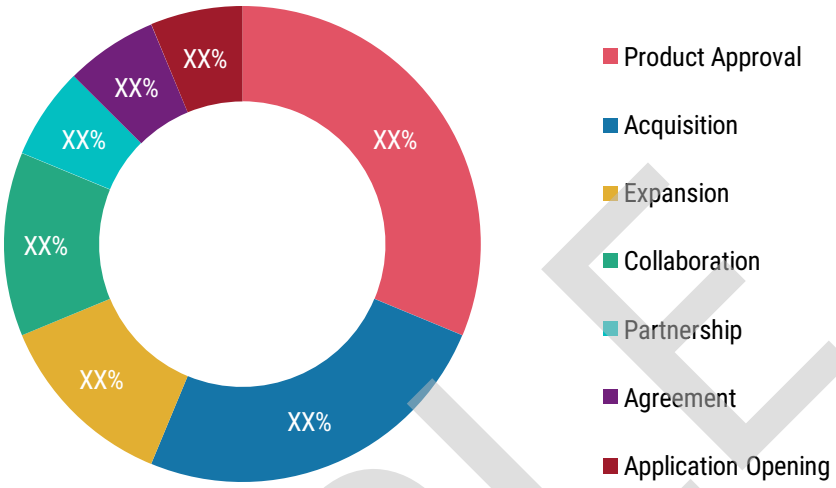
Company Name	Product Approval	Expansion	Collaboration	Acquisition	Partnership	Agreement	Application Opening	Total
Arcadia	XX	XX	XX	XX	XX	XX	XX	XX
Thermo Fisher Scientific	XX	XX	XX	XX	XX	XX	XX	XX
Bayer AG	XX	XX	XX	XX	XX	XX	XX	XX
Biocentury Transgene Co. Ltd.	XX	XX	XX	XX	XX	XX	XX	XX
Vilmorin & Cie	XX	XX	XX	XX	XX	XX	XX	XX
Eurofins Scientific	XX	XX	XX	XX	XX	XX	XX	XX
LGC Biosearch Technologies	XX	XX	XX	XX	XX	XX	XX	XX
Corteva Agriscience	XX	XX	XX	XX	XX	XX	XX	XX
Dr. Chip Biotech Inc.	XX	XX	XX	XX	XX	XX	XX	XX
Evogene Ltd	XX	XX	XX	XX	XX	XX	XX	XX
Yield10 Bioscience, Inc	XX	XX	XX	XX	XX	XX	XX	XX
Total	XX	XX	XX	XX	XX	XX	XX	XX

Source: Company Website, Annual Report, and Press Release



10.7 KEY DEVELOPMENTS & GROWTH STRATEGIES

FIGURE 17 GLOBAL AGRICULTURAL BIOTECHNOLOGY MARKET, KEY DEVELOPMENTS & GROWTH STRATEGIES (%)



10.7.1 PRODUCT APPROVALS/ PRODUCT LAUNCH

TABLE 33 PRODUCT APPROVALS / PRODUCT LAUNCH

Date	Company Name	Developments
November 2019	Arcadia Biosciences	Arcadia Biosciences (Verdeca) completed the regulatory review process and received approval for its HB4 drought and herbicide-tolerant soybeans from the Paraguayan Minister of Agriculture, through the National Commission for Agricultural and Forestry Biosafety. Thus, the company aims to expand its presence in the South American region.
August 2019	Arcadia Biosciences	Verdeca received approval from the US Department of Agriculture (USDA) for its HB4 drought tolerant soybeans, which will allow commercialization in the US market.
XX	XX	XX
XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.7.2 EXPANSION

TABLE 34 EXPANSION

Date	Company Name	Developments
August 2019	Yield10 Bioscience, Inc.	Yield10 Bioscience, Inc. announced the expansion of its non-exclusive research license with Bayer for assessment of a Novel C3004 yield trait gene in soybean. This non-exclusive research license is expected to help the company to evaluate C3004 yield trait with respect to the commercial aspect.
XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.7.3 ACQUISITIONS

TABLE 35 ACQUISITIONS

Date	Company Name	Developments
March 2019	Thermo Fisher Scientific	Thermo Fisher acquired Brammer Bio, a leader in viral vector manufacturing. This acquisition strengthened the company's product portfolio to cater to various pharmaceutical and biotechnology customers.
XX	XX	XX
XX	XX	XX
XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.7.4 COLLABORATIONS

TABLE 36 COLLABORATIONS

Date	Company Name	Developments
XX	XX	XX
XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.7.5 PARTNERSHIPS

TABLE 37 PARTNERSHIPS

Date	Company Name	Developments
XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.7.6 AGREEMENT

TABLE 38 AGREEMENT

Date	Company Name	Developments
XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

10.7.7 APPLICATION OPENING

TABLE 39 APPLICATION OPENING

Date	Company Name	Developments
XX	XX	XX

Source: Annual Report, Press releases, Associations, Government Records, Journals, Expert Interviews, Secondary Research, and Market Research Future Analysis

11 COMPANY PROFILES

11.1 THERMO FISHER SCIENTIFIC

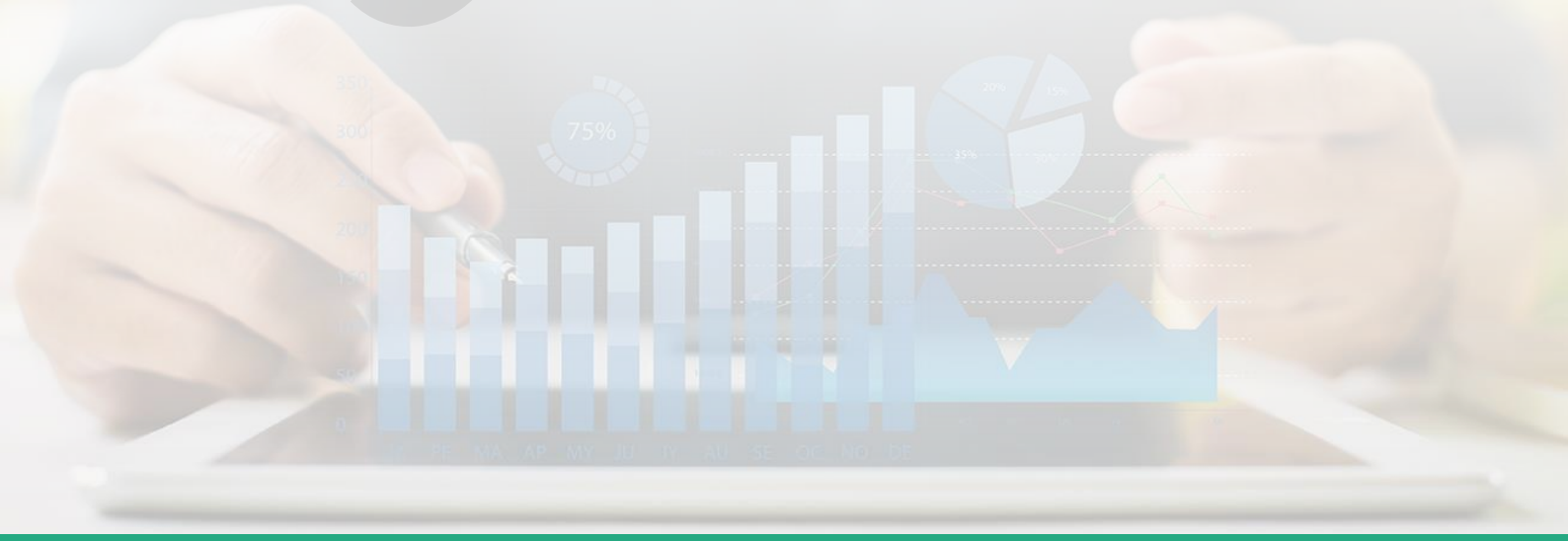
11.1.1 COMPANY OVERVIEW

Company Headquarters: Massachusetts, US

Founded: 2006

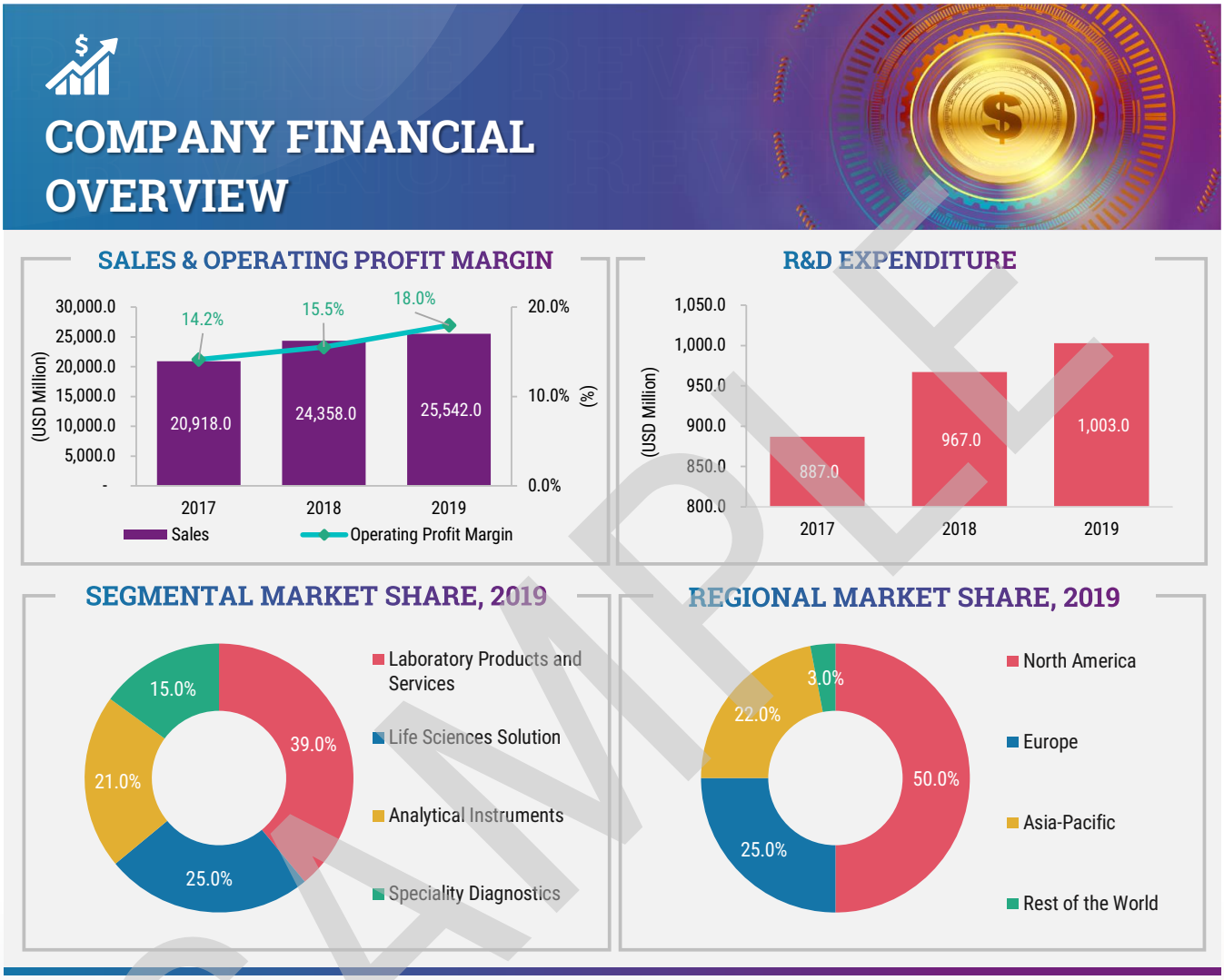
Workforce: ~70,000+

Company Working: Thermo Fisher Scientific specializes in various biotechnology products such as analytical instruments, laboratory supply chain programs and e-commerce, laboratory equipment, lab services, specialty diagnostics, and others. The company helps its customers accelerate life sciences research, solve complex analytical challenges, improve patient diagnostics, deliver medicines to the market, and increase the productivity of the laboratory. It has five premier brands, namely, Thermo Scientific, Applied Biosystems, Invitrogen, Fisher Scientific, and Unity Lab Services through which it offers an unmatched combination of innovative technologies, purchasing convenience and comprehensive services.



11.1.2 FINANCIAL OVERVIEW

FIGURE 18 THERMO FISHER SCIENTIFIC: FINANCIAL OVERVIEW SNAPSHOT



Source: Annual Report, Press Releases, and MRFR Analysis

11.1.3 PRODUCTS/SERVICES OFFERED

TABLE 40 THERMO FISHER SCIENTIFIC: PRODUCTS/SERVICES OFFERED

Category	Products/Services
Agrigenomics	• AgriSeq Targeted GBS Solutions • Animal Parentage STR Kits • Axiom DNA Microarrays • Eureka Targeted GBS Solutions • TaqMan Genotyping Solutions • TaqMan Master Mixes • Others

Source: Annual Report, Press Releases, and MRFR Analysis

11.1.4 KEY DEVELOPMENTS

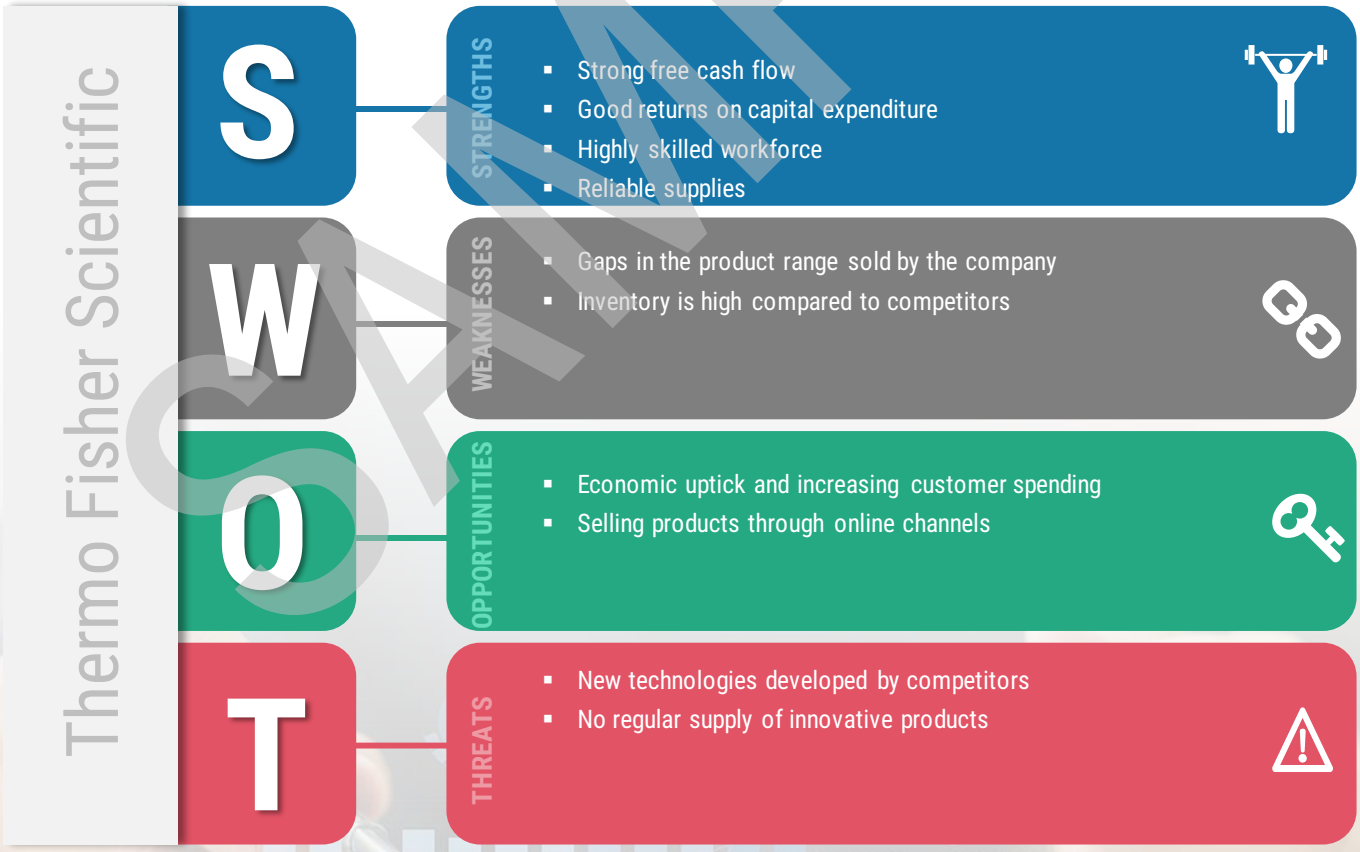
TABLE 41 THERMO FISHER SCIENTIFIC: KEY DEVELOPMENTS

Date	Approach	Development
March 2019	Acquisition	Thermo Fisher acquired Brammer Bio, a leader in viral vector manufacturing. This acquisition strengthened the company's product portfolio to cater to various pharmaceutical and biotechnology customers.
January 2016	Acquisition	Thermo Fisher acquired Affymetrix Inc., a leading provider of cellular and genetic analysis products. With this, the company expanded its product portfolio for life sciences and translational research, molecular diagnostics, reproductive health, and agricultural biotechnology.

Source: Annual Report, Press Releases, and MRFR Analysis

11.1.5 SWOT ANALYSIS

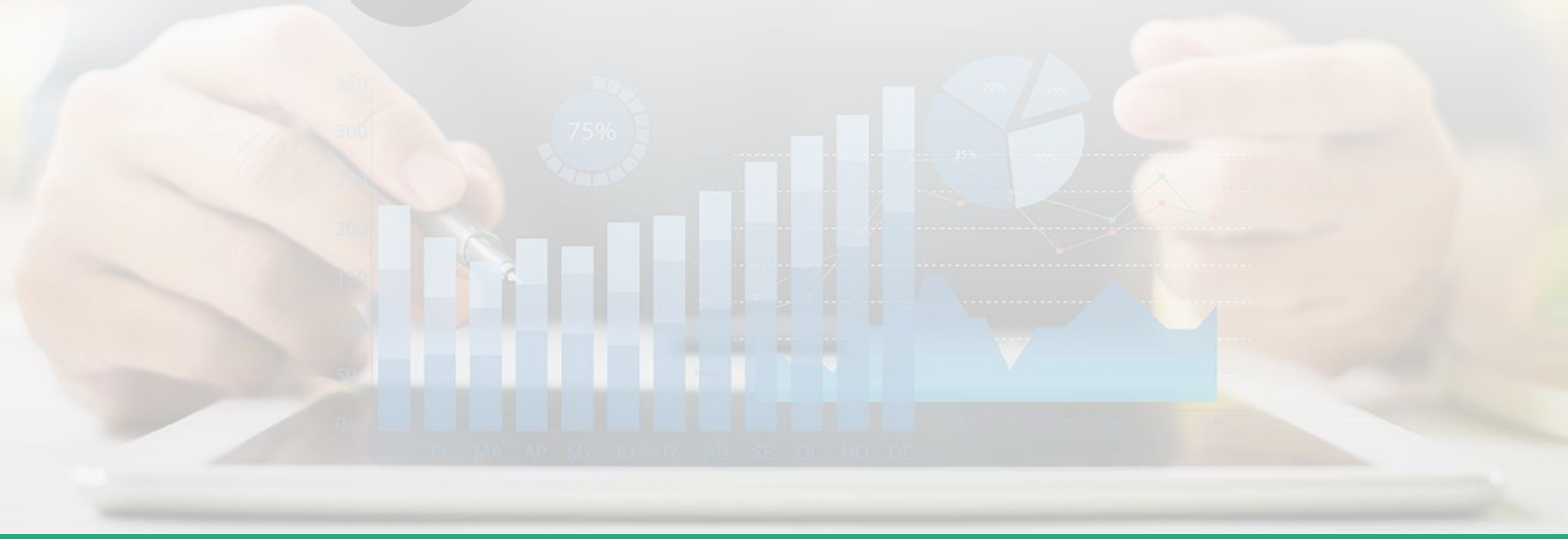
FIGURE 19 THERMO FISHER SCIENTIFIC: SWOT ANALYSIS



Source: Annual Report, Press Releases, and MRFR Analysis

11.1.6 KEY STRATEGIES

Thermo Fisher Scientific focuses on the pricing of products to provide attractive volume expansion opportunities and to develop innovative pharmaceutical products by strengthening research and development activities. Moreover, the company expands its presence in emerging markets through partnerships and acquisitions. It has also set up several manufacturing and commercial facilities in countries, such as China, South Korea, India, and Singapore.



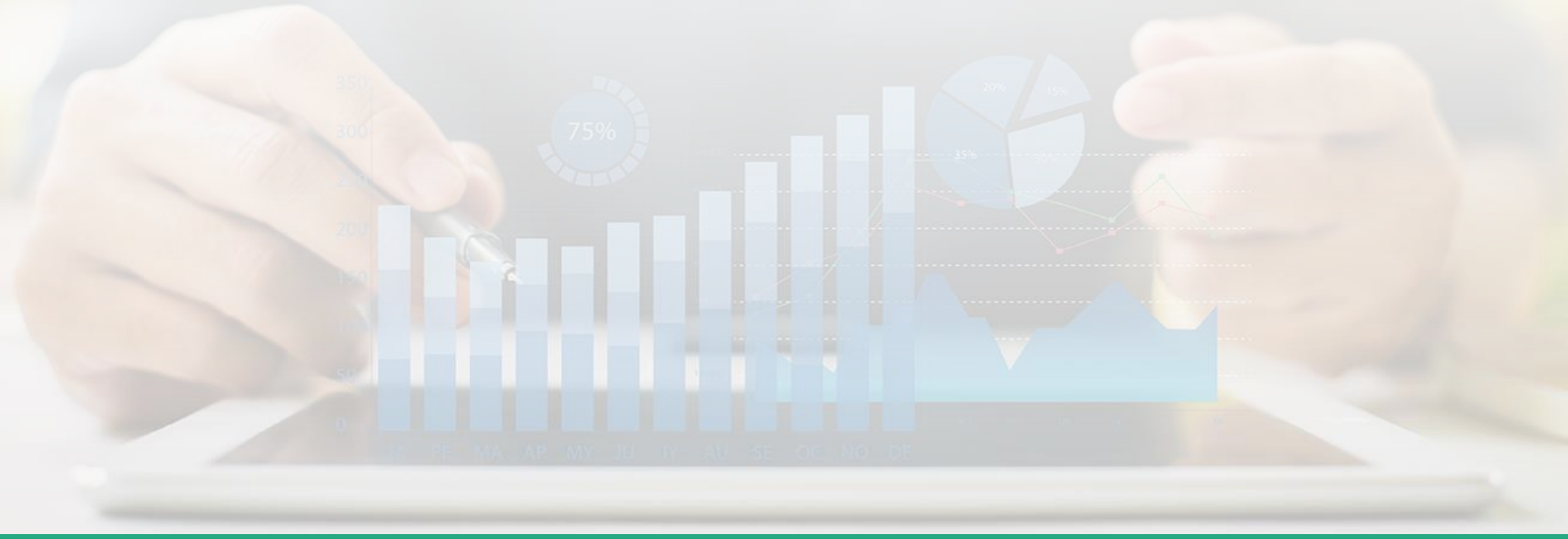
12 APPENDIX

12.1 REFERENCES

- International Service for the Acquisition of Agri-biotech Applications
- United States Department of Agriculture
- Biotechnology Innovation Organization
- Agricultural Biotechnology Council
- National Center for Biotechnology Information (NCBI),

12.2 RELATED REPORTS

SR. NO.	REPORT TITLE	PUBLISH MONTH
1	**Agriculture Equipment Market Research Report - Global Forecast till 2025** Global Agriculture Equipment Market Research Report: By Product Type (Tractor, Harvester, Cultivation & Soil Separation Equipment, and Others), Function (Harvesting, Planting & Fertilizing, Haying, Plowing & Cultivation, and Others), Sales Channel (OEM and Aftermarket), and Region (North America, Europe, Asia-Pacific, and Rest of the World)– Forecast till 2025 https://www.marketresearchfuture.com/reports/agriculture-equipment-market-2182\	November 2019
2	**Next Generation Sequencing Market Research Report – Forecast to 2023** Global Next Generation Sequencing Market: By Technology (Whole Genome and Methyl Sequencing), by Service & Product (Sample Preparation, Consumables, Platform, & Services for Platforms), Application (Drug Discovery, Diagnostics)–Global Forecast Till 2023 https://www.marketresearchfuture.com/reports/next-generation-sequencing-market-6354	November 2019



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