Semiochemicals Market Size and Share Outlook - Forecast Trends and Growth Analysis Report (2025-2034)

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Report description:

The global semiochemicals market was valued to reach a market size of USD 5.66 Billion in 2024. The industry is expected to grow at a CAGR of 15.20% during the forecast period of 2025-2034. The adoption of sustainable agricultural practices, the increasing awareness regarding eco-friendly pest management solutions, and the demand for organic farming boost the semiochemicals market as these are safer, eco friendly alternatives to traditional chemical pesticides, thus aiding the market growth to attain a valuation of USD 23.30 Billion by 2034.

Semiochemicals Market Overview

The semiochemicals market is growing at a significant rate. Sustainable and environmentally friendly pest management solutions contribute to growth. These compounds provide targeted pest control with a minimum impact on the environment and are, therefore, suitable for integrated pest management programs. The increasing concern regarding the adverse impacts of chemical pesticides on ecosystems as well as the stiff government regulations have accelerated the shift toward semiochemicals. Another main reason for adopting these compounds is the global effort to pursue organic farming and minimize crop losses. Major market trends include advanced formulation technologies like microencapsulation for the efficacy and stability of semiochemicals in variable environments. There has also been growing integration of semiochemicals with digital agriculture solutions such as precision farming tools and pest monitoring systems that further enhance application efficiency and the ability to monitor real-time populations. Such factors have been significantly responsible for the semiochemicals demand growth during the forecast period.

Key players in the semiochemicals market are now focusing on research and development in order to come up with innovative new formulations that will further broaden their product portfolio. Strategic collaboration and acquisitions enable companies to venture into new geographies and satisfy various agricultural requirements. Increased awareness of sustainable agriculture is also making the scope of the market wider across both developed and emerging economies, creating potential for long-term growth.

Semiochemicals Market Growth

The key factors driving the growth of the semiochemicals market in the near future are the increasing interest in organic farming practices, growing demand for high-value crops, and the efforts made by various governments to support effective pest management programs.

These factors help to minimize health hazards arising from the use of toxic chemical pesticides and fertilizers. The scope for pheromones is increasing in pesticide application as the pesticide-resistant species are on the rise. The rising demand for efficient pest control that works on pesticide-resistant is also boosting the growth of the semiochemical market. The growing consumer preference for organic food has led to an increase in organic farming.

Semiochemicals are preferred in organic farming as they are of natural origin and cause less harm to the environment. Ongoing research into semiochemicals discovery has resulted in finding new semiochemicals while upgrading existing ones. Thus, it contributes to higher demand growth of semiochemicals. Progressing toward increased application, it widens its uses over many crops and kinds of pests in the implementation of integrated pest management practices. For example, experiments show how the management of such notorious pests like the fall armyworm and fruit flies in the maize crop and fruits could be significantly implemented by the use of semiochemicals. These developments enhance IPM strategies with sustainable alternatives for farmers to replace conventional pesticides. In India, there are integrated efforts to add semiochemicals to the pest management regime. The ICAR has conducted research on pheromone-based pest control methods to minimize pesticide use and promote sustainable agriculture.

Key Trends and Developments

The semiochemicals market is growing due to their integration into IPM systems, technological advancements, use in organic farming, and the shift toward biological pest control, offering sustainable, eco-friendly alternatives to traditional pesticides.

September 2024

Over 200 pest management experts gathered at Swansea University from September 2 to 4 for an important conference focused on fostering innovation in the industry. The event, which emphasized Integrated Pest Management (IPM), was organised by IBMA UK and the Natural Products BioHUB at Swansea University.

July 2024

ISCA launched ACTTRA Percevejo, a sustainable semiochemical solution for controlling stink bugs in Latin America. It attracts and kills stink bugs when mixed with small doses of insecticide, offering an effective, cost-competitive alternative to traditional methods.

April 2024

A professor from the University of Sao Paulo provided insights during a panel discussion on smart agriculture at FAPESP Week Illinois, which took place in Chicago, United States. The insights stated that around 90% of the land used for sugarcane farming in Brazil utilises natural adversaries, such as microorganisms, macroorganisms, biochemicals, and semiochemicals.

November 2023

A study published in The Proceedings of the National Academy of Sciences (PNAS) explored how certain chemicals produced by female insects, known as semiochemicals, influence mating behaviours. These chemicals act as aphrodisiacs, signalling female maturity and readiness to mate, thereby stimulating male courtship behaviours.

Adoption of Integrated Pest Management (IPM) Systems

Semiochemicals are being increasingly used in Integrated Pest Management (IPM) systems as they are non-toxic and effective in pest control. Through the use of pheromones and other semiochemicals, farmers can monitor the population of pests and reduce the use of chemical pesticides. For instance, Syngenta employs pheromone-based traps to detect and manage pests in fruit crops, thus providing a sustainable solution. This trend is in line with global agricultural policies aimed at reducing pesticide use without compromising crop productivity. IPM systems are a significant driver of semiochemical market growth, as these are considered an integral part of sustainable farming practices, thus augmenting the semiochemicals demand growth.

Technological Advancements in Formulation and Application

The semiochemicals market is gaining from continuous advances in formulation technologies, such as microencapsulation and slow-release systems. These innovations improve the stability, effectiveness, and longevity of semiochemicals in the field. For instance, the company AgBiTech has developed microencapsulated pheromones, which extend the duration of pest control and reduce application frequency. This trend allows farmers to apply fewer products while achieving better results, making semiochemicals an even more viable alternative to conventional pesticides. Technological advancement enhances application with accuracy and minimizes the environmental footprint. The overall market demand will also increase as a result.

Increasing Use in Organic Farming

As organic farming becomes increasingly common, semiochemicals become the perfect substitute for pesticides for controlling pests due to their natural and non-toxic application methods on crops. In organic farming, for example, one must find other chemical pesticides substitutes, and that increases the need for semiochemicals: for instance, for pheromone traps or repellents. The companies offer, for instance, pheromone-based products for managing pests in organic fruit and vegetable farming. And, as it will be mentioned further, such expansion will be in line with an increase in the demand from consumers for organic, pesticide-free food and ecologically oriented agricultural practices. This is, by all means, the best market fit for semiochemicals, thereby improving the semiochemicals market revenue.

Shift Toward Biological Pest Control Products

Semiochemicals are becoming increasingly popular in a much wider trend towards biological pest control products. Environmental and regulatory change are both drivers here. Farmers increasingly seek biological solutions, pheromones being one such area of pest control that is free of the side effects associated with synthetic chemicals. For example, BASF's biological pest control solutions contain pheromones to control pest populations in crops such as cotton and vegetables. This trend is part of a larger shift toward sustainable agriculture practices where semiochemicals reduce environmental contamination and enhance the safety of agricultural products. Semiochemicals are an important growth driver with increasing demand for biological solutions.

Semiochemicals Market Opportunities

Many governments are promoting sustainable farming practices by supporting the use of semiochemicals. Policies favouring integrated pest management (IPM) and restrictions on chemical pesticide use are encouraging the adoption of semiochemical-based solutions. For instance, The US Department of Agriculture (USDA) promotes IPM, which combines biological, cultural, physical, and chemical tools to manage pests sustainably. This approach encourages using semiochemicals as part of

pest management strategies and can increase semiochemicals market revenue.

The EU's directive aims to reduce risks associated with pesticide use by promoting IPM and alternative approaches like semiochemicals. Member states are encouraged to implement policies that support these methods. Furthermore, India's Ministry of Agriculture and Farmers Welfare implements a national IPM program that promotes the use of biological control agents, including semiochemicals, to reduce reliance on chemical pesticides.

Semiochemicals Market Trends

Rising Concerns Regarding Synthetic Pesticides and Insecticides

The market for biopesticides is poised to expand quickly as a result of growing concerns regarding the use of synthetic pesticides and their potentially harmful effects on the environment. This has compelled numerous pesticide manufacturers to develop new pest management systems, which are fuelling the demand of semiochemicals market.

For instance, as of April 2024, Brazil had roughly 629 registered biological products for pest management, which included microorganisms, macroorganisms, biochemicals, and semiochemicals. This number has been steadily increasing each year, according to the Sao Paulo Advanced Research Center for Biological Control, an Engineering Research Center (ERC) established by FAPESP in partnership with the company Koppert.

Research shows that about 20% of agricultural producers globally use biological products. Brazil is notable for having 55% of its farms employing biocontrol methods, compared to just 6% in the United States. When it comes to biostimulants, Brazil's usage stands at 50%, while the U.S. is at 16%. For biofertilizers, the figures are 36% for Brazil and 12% for the United States. Currently, Brazil has around 170 biofactories operating over approximately 25 million hectares, generating more than USD 1 billion annually, with a projected growth rate of 15% to 20% per year.

Innovations in the Agriculture

In the sugarcane industry, where Brazil is the world's leading producer with 22 million hectares cultivated and a fourfold increase in production over the past 40 years, biological control has been combined with advanced technologies such as monitoring systems, sensors, artificial intelligence, and autonomous vehicles to improve its effectiveness.

For instance, innovations in the development and application of semiochemicals have enhanced their effectiveness and contributed to the semiochemicals market value. Advanced delivery systems and formulations have improved the stability and efficiency of these compounds, making them more accessible to farmers. Tailor-made formulations have been developed to protect semiochemicals from environmental factors like UV light and oxidation, which can degrade these compounds. By improving release performance and duration, these formulations trigger the desired reactions in target insects more effectively. This development has expanded the practical applications of semiochemicals in various agricultural settings.

Semiochemicals Market Restraints

Developing and producing semiochemicals can be expensive due to the complexity of synthesising these natural compounds. This often results in higher prices compared to conventional pesticides, potentially limiting their adoption among cost-sensitive farmers. The approval process for new semiochemical products can be lengthy and complex, varying across different regions, and can hinder semiochemicals demand. These regulatory challenges can delay market entry and increase development costs.

Many farmers and agricultural stakeholders are not fully aware of the benefits and applications of semiochemicals. This lack of

knowledge can hinder their widespread use in pest management practices. The effectiveness of semiochemicals can be largely influenced by environmental conditions such as temperature, humidity, and wind. This variability can affect their reliability and consistency in pest control.

Semiochemicals Industry Segmentation

Semiochemicals Market Report and Forecast 2025-2034 offers a detailed analysis of the market based on the following segments:

Market Breakup by Type

- Pheromones
- Allelochemicals

Market Breakup by Function

- Detection and Monitoring
- Mass Trapping
- Mating Disruption

Market Breakup by Crop Type

- Field Crops
- Orchard Crops
- Vegetable Crops

Market Breakup by Region

- North America
- Europe
- Asia Pacific
- Latin America
- Middle East and Africa

Semiochemicals Market Share

By Type Insights

Pheromones hold the largest semiochemicals market share. They are chemical signals used by organisms, particularly insects, to communicate with others of the same species, influencing behaviours such as mating and aggregation. Pheromones are extensively utilised in integrated pest management (IPM) strategies to control pest populations in agriculture. Allelochemicals, on the other hand, are chemical signals that mediate interactions between different species, such as plants and insects.

By Function Insights

Mating disruption is the most important method among the primary techniques used for pest management. This approach involves releasing synthetic pheromones into the environment, which interferes with the mating behaviours of pest insects, effectively reducing their populations. It is particularly effective for managing low to moderate levels of pest infestations and is

widely used in integrated pest management (IPM) systems, further contributing to the semiochemicals industry revenue.

In addition, detection and monitoring, as well as mass trapping, play crucial roles in this field. Detection and monitoring use semiochemicals to attract pests to traps, enabling early detection and assessment of populations. Mass trapping involves setting up numerous traps to capture and decrease pest populations, often used in conjunction with other control methods.

By Crop Type Insights

Based on crop type, the orchard crops segment is anticipated to grow significantly over the course of the forecast period as consumer demand for organic and clean-label goods is anticipated to drive the adoption of these crops. Orchard crops include apples, apricots, pears, cherries, prunes, walnuts, hazelnuts, almonds, oranges, kiwis, grapefruits, dates, and figs. Due to the increasing demand for high-value crops among customers, semiochemicals are largely used on orchard crops as opposed to other crop kinds, such as vegetables and field crops, thus aiding the semiochemicals market opportunities.

Orchard crops are additionally more vulnerable to pests such fruit flies, codling moths, and peach tree borers. Semiochemicals operate on target pests indirectly and influence their behaviour by attracting or disrupting them, preventing any harm to vegetables. Accordingly, they have developed into one of the most important instruments in the integrated pest management of a variety of crops.

Semiochemicals Market Regional Insights

North America Semiochemicals Market Dynamics

With the rising adoption of integrated pest management systems for sustainable agriculture, North America is predicted to witness rapid growth in the market over the forecast period. As per the semiochemicals industry analysis, as food trade grows within the region, countries like Canada, Mexico, and the United States would have a greater need for high yielding and high-quality food. Large cultivation areas allow for high-value plantations, and it is projected that this will help this region continue to have a significant market share over the forecast period.

Asia Pacific Semiochemicals Market Trends

Asia Pacific is predicted to account for a significant revenue share in the market due to its vast population, growing demand for organic farming, and expanding uptake of eco-friendly pest management services in nations like China and India. As the agriculture sector is a primary source of revenue and a significant contributor to the GDP in many nations, the Asia Pacific region is projected to have further growth of the semiochemicals industry. Developing countries in the region are also focusing on sustainable agriculture to meet the food demands of their large populations.

Europe Semiochemicals Market Drivers

The European Union's stringent regulations on pesticide use, such as the Sustainable Use of Pesticides Directive, encourage the adoption of alternative pest control methods, including semiochemicals. As part of the European Green Deal, this strategy aims to make food systems fair, healthy, and environmentally friendly. It sets targets to reduce the use of chemical pesticides by 50% by 2030, promoting the adoption of alternative pest control methods like semiochemicals that can influence semiochemicals market dynamics and trends.

Common Agricultural Policy (CAP) is a cornerstone of the EU's agricultural policy, providing financial support to farmers who adopt sustainable practices. It encourages integrated pest management (IPM) strategies, which often incorporate semiochemicals as

alternatives to chemical pesticides.

Latin America Semiochemicals Market Opportunities

Latin America's variety of crops and farming systems presents numerous opportunities for semiochemicals to be tailored to specific agricultural needs, enhancing their effectiveness across different settings. Many Latin American countries are implementing policies that promote the use of semiochemicals in agriculture. These initiatives aim to reduce the environmental impact of farming and encourage the adoption of safer pest management techniques.

For instance, Argentina has adopted integrated pest management (IPM) strategies that incorporate semiochemicals to reduce reliance on chemical pesticides, boosting the semiochemicals market expansion. The government promotes research and development in this area, encouraging the adoption of semiochemical-based methods among farmers.

Middle East and Africa Semiochemicals Market Outlook

Countries such as Kenya and South Africa are adopting semiochemicals to enhance crop yields and ensure food security. Kenya's Ministry of Agriculture reported a 20% increase in maize yields in 2020 due to integrated pest management practices incorporating semiochemicals. The Food and Agriculture Organization (FAO) has been supporting African nations in implementing sustainable pest control methods, including semiochemicals, to address locust infestations, which positively impacts semiochemicals demand forecast. The region's varied agricultural landscape also presents opportunities for semiochemicals to be tailored to specific crops and farming systems, enhancing their effectiveness across different settings.

Innovative Startups in the Semiochemicals Market

Startups are creating novel semiochemical-based products to improve pest control. For instance, some companies are developing micropeptides as biological herbicides for row crops, offering an eco-friendly alternative to traditional chemical herbicides. Forming partnerships with established companies and research institutions further allows startups to access resources and expertise, accelerating product development and semiochemicals market entry.

Micropep Technologies

Micropep is a biotechnology company specializing in the development of micro peptide-based solutions for sustainable agriculture. They have created a proprietary AI-powered discovery platform called Krisalix, which enables the rapid identification of micropeptide molecules for crop protection. In July 2024, Micropep raised USD 29 million in Series B funding to accelerate its go-to-market strategy and expand its pipeline of micropeptide active ingredients.

Inscentinel

Inscentinel is a biotechnology firm focused on harnessing the olfactory abilities of insects, particularly honeybees, for trace vapour detection. They have developed a handheld device called the VASOR136, which holds 36 trained bees capable of detecting various vapours. This technology offers a cost-effective and efficient alternative to traditional detection methods, with applications in the security and health sectors.

Competitive Landscape

Several semiochemicals market players are investing in research and development to create new semiochemical products and improve existing ones. For example, some biotechnology companies are collaborating with crop protection companies to

introduce semiochemical-based products aimed at pest control in crops. To tap into emerging markets, market players are expanding their operations into regions with growing demand for semiochemical products. Asia Pacific, in particular, is expected to grow the fastest during the forecast period due to the increasing adoption of eco-friendly pest management services in countries such as India and China.

Bedoukian Research, Inc.

Bedoukian Research, Inc., a 100% family-owned business with its headquarters in the United States, was established in 1972. The company was created with the goal to address the need for premium speciality aroma molecules. Today, it provides the pharmaceutical and speciality chemical sectors with custom manufacturing services and more than 350 high-impact fragrance and flavour compounds.

Russell IPM Ltd

Russell IPM Ltd, with its headquarters in the United Kingdom, is a pioneer in the development of integrated pest management (IPM) technologies. The business offers pheromones, traps, and supplies for pest control all around the world. Its entire product line works to safeguard every stage of the food supply chain, utilising techniques that lessen the usage of chemical pesticides for a secure, sustainable, and environmentally responsible method of preventing pest damage to food and other products.

Suterra LLC

Suterra LLC, is one of the largest manufacturers of mating disruption products for commercial pest control and crop protection, with headquarters in Oregon, United States. The company utilises naturally occurring substances like pheromones and is committed to researching, producing, and commercialising environmentally responsible solutions. Their products do not contaminate ground water, injure plants or animals, leave no harmful residues in the soil or on plants, and do not disrupt populations of helpful insects.

CBC (Europe) GmbH

Established in 1986, CBC (Europe) GmbH, headquartered in Dusseldorf, Germany, offers semiochemicals through its BIOGARD division, specializing in pheromone-based products for Integrated Pest Management (IPM) in agriculture.

Other market players include Isagro S.p.A., among others.

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