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Biological Control Agents 2022

Biopesticides and related BCAs

Crop Science | **Report**

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Crop Science

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Executive Summary

The biocontrol agent (BCA) market is estimated to be worth around $3bn and growing at a rate of 7% p.a., considerably above the rate on conventional crop protection products. We forecast the BCA market to reach $6bn by 2030.

It comprises around 1000 active ingredients distributed between 4 sectors: microbials, plant extracts, semiochemicals and macrobials. Of the 4 sectors microbials is by far the largest accounting for around 60% of the estimated $3bn market, followed by macrobials, plant extracts and semiochemicals.

There are multiple drivers behind the market growth: Environmental, Social, and Governance (ESG); pull from the food chain; agricultural policy; fast track regulatory systems for BCAs; increasing pressures on conventional crop protection products; insect, disease and weed resistance to conventional crop protection products; innovation and technological advances. On the other hand, there are some restraining forces, such as the narrower spectrum of biological activity of many BCAs compared to conventional broad spectrum crop protection products, challenges over stability and shelf life and the complexity of Integrated Pest Management (IPM) systems incorporating BCAs which necessitates a high level of training, education and stewardship.

Europe and N America each account for around 30% of the BCA market, with BCAs accounting for around 8-9% of those regional crop protection markets. Asia and Latin America account for 20% and 16% respectively. Europe has achieved this share despite having a less favourable regulatory environment than most other regions. This may be about to change with recently introduced new regulations for microorganisms.

Over 500 companies are involved in the BCA and biostimulants market, many companies selling both types of product. They range from large diversified companies, agricultural input companies, agribusinesses and specialist biologicals companies, both start-ups and established. By our estimation, few of the companies currently generate more than $40m in sales of BCA’s.

The market is highly competitive, with relatively low barriers to entry compared to those for conventional crop protection. For the leading products there are multiple suppliers and brands. The challenge for many of the ‘long tail’ of companies is to develop innovative or differentiated solutions and to establish market access channels.

A large amount of venture capital is flowing into the sector reflecting the attractiveness of the sector to investors.

History and timeline

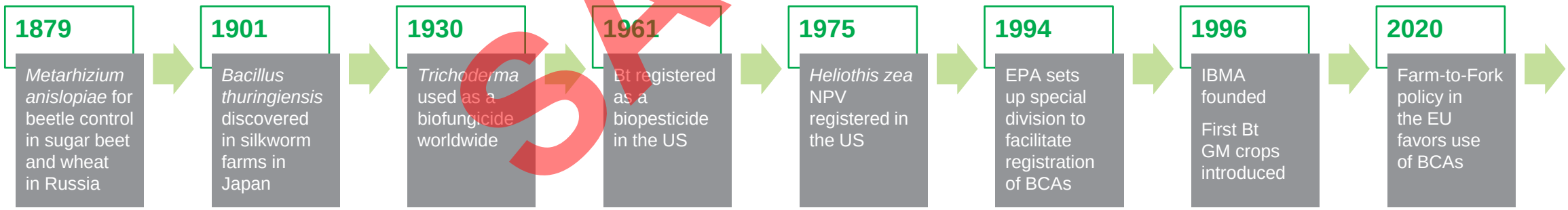
Use of some BCAs, notably plant extracts, for pest control has been practised for centuries. Specific examples of use of BCAs can be traced to the 19th century, when *Metarhizium anisopliae* was used to control beetle larvae in wheat and sugar beet in Russia. Bt (*Bacillus thuringiensis*) was discovered in 1901 in silkworm farms in Japan before first being used in the 1920s. In 1961 it was registered as a biopesticide in the US, and today it remains one of the largest products in the biologicals sector, with many strains having been developed and new launches still occurring.

As far as biofungicides are concerned, a major product is *Trichoderma*, and the first product was launched in the 1930s.

The first semiochemicals and viruses were launched in the 1970's and have had a chequered history, coming in and out of usage, depending, for example, on the level of government support, as was the case with boll weevil eradication programs in the US.

For a long time, BCAs were viewed with some scepticism and distrust, however, in recent years they have gained much wider acceptance and become increasingly mainstream.

Historical development of BCAs



Source: IHS Markit

Regulatory landscape – European Union (EU)

EU member states have recently approved new rules to facilitate the approval of micro-organisms for use as active ingredients (ais) in crop protection products. Member states endorsed four implementing regulations that will simplify the process of approval of biocontrol agents (BCAs) under the EU agrochemical registration Regulation (1107/2009). The implementing regulations will be scrutinised by the European Parliament and the Council next. If they do not object, the regulations will be adopted and be applicable in the fourth quarter of 2022, most likely by November.

Regulation 1107/2009 was designed for chemical ais and there have long been calls for specific rules for biopesticides. The Commission outlined plans in early 2020 to set new criteria for pesticide Farm-to-Fork s based on micro-organisms. Calls for faster action in this area have intensified since the Commission set use-reduction targets for chemical pesticides in its strategy. Significantly reducing the use of chemical pesticides is one of the goals of the Farm-to-Fork strategy, which charts the transition to a sustainable food system. EU Health and Food Safety Commissioner Stella Kyriakides has stated the commitment to reduce by 50% the use of chemical pesticides by 2030 and the importance of providing alternatives that respect the planet and human health aspects.

The new rules follow a different approach based on the biology and ecology of each micro-organism and take into account the most recent scientific knowledge, the European Commission says. That way, the rules are more ‘fit for purpose’ and flexible. The biological properties of the micro-organisms play a central role for the risk assessment and many data required in the new implementing acts are conditional to the biology and ecology of the particular micro-organism. The Commission points out that more ‘fit for purpose’ and flexible requirements imply streamlined application dossiers, more straightforward risk assessment, and shorter timelines to get access to the EU market.

There are currently over 60 micro-organisms approved for crop protection use in the EU. However, companies such as Israel-based STK have recently commented that approval for new BCA products in the EU, such as for fruit and vegetable crops in Mediterranean countries remains challenging.

The UK, having originally been a biologicals pioneer, is also now becoming a tougher environment for BCAs, with more hurdles, despite the new opportunities for diverging from Brussels from Brexit, with regulatory policy firmly focused on gene-edited seeds and crops following a government consultation launched in 2021. In the meantime, it is still following EU regulations.

Global market overview

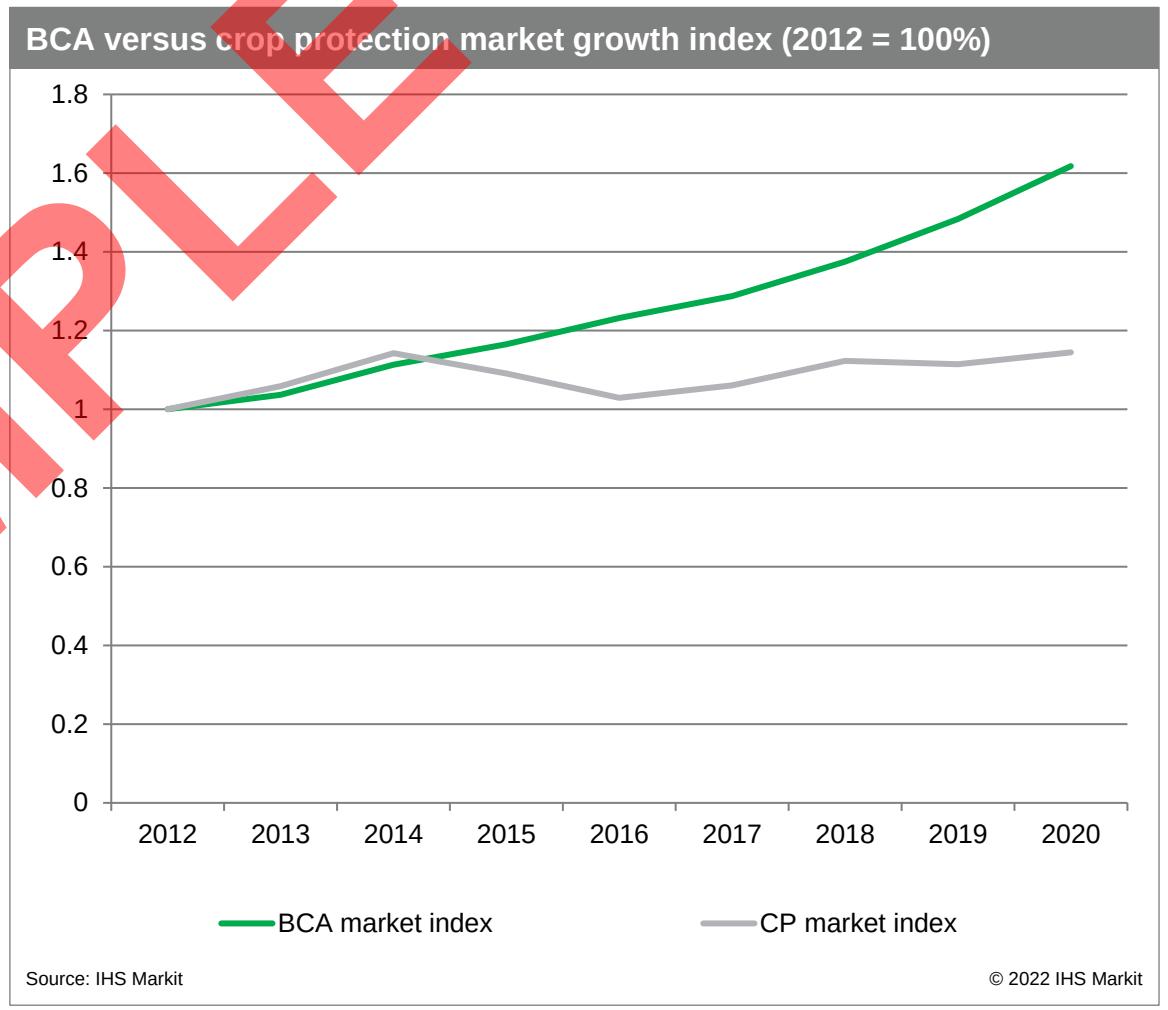
Current status of the market for biological control agents

After a period of slow growth through the 1980s and 1990s, BCA market growth accelerated from 2000 onwards, and has consistently outstripped growth of conventional crop protection products.

The current value of the BCA segment is around $3bn, which means it has a 5% share of the total crop protection market, the value of which was estimated at $62bn, or $70bn if non-crop uses are also included. In other words, it remains a niche sector.

It is estimated that the market has grown by over 60% over the last 8 years, compared with 14% for the conventional crop protection market

It is estimated (in IHS Markit's Biologicals Market Data) that there are around 1000 active ingredients in the sector. These are used alone and in combination in over 5,000 brands, which are sold by over 500 companies. Over 90% of actives have sales of less than $10m.



Agricultural policy

Another avenue through which demand for BCAs can be influenced is that of agricultural policy. This is most evident in the EU, where the Farm-to-Fork policy, published in 2019 as part of the EU's Green Deal, and still being worked through has specific provisions both for BCAs, use of which it wishes to increase, and for use of conventional crop protection products, which it wishes to reduce by 50%.

The Farm-to-Fork policy also has provisions to increase adoption of IPM and eco-friendly alternatives to conventional crop protection products, and the area under organic agriculture. All these elements of the strategy will drive demand for BCAs.

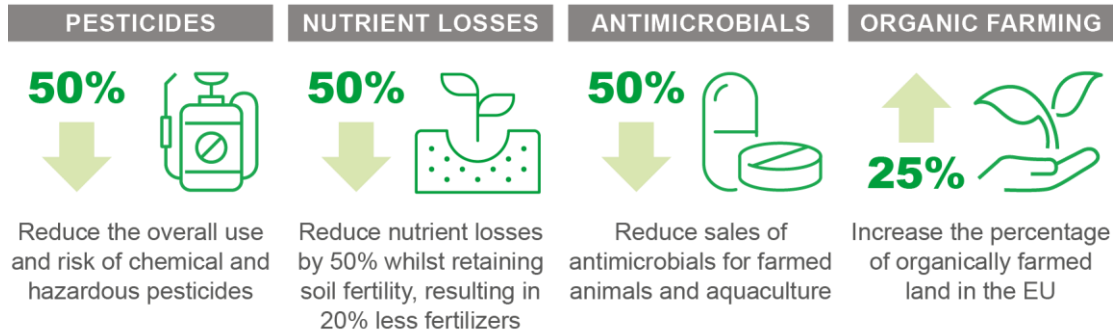
The mechanism through which the EU hopes to achieve these objectives is the Sustainable Use Directive (SUD) which is currently undergoing a revision process. After a period of consultation in 2021 new proposals for the SUD are likely to be submitted in 2022. These may make the reduction targets of 50% for both conventional crop protection and hazardous products legally binding. In the past the EU has voiced its disappointment with the rate of adoption of IPM, and it hopes these new measures will also remedy that. At the time of writing the war in Ukraine has put renewed emphasis on food security and as a result the decision on the revision of the SUD is likely to be delayed, as an economic analysis concluded it would lead to a reduction in food production in the EU.

As far as organic agriculture is concerned, the target of 25% penetration by 2030 is way above the current level of 7.5% and it is rather unlikely that demand for organic produce will increase sufficiently to justify this level of production.

European Green Deal

Source: European Commission

European Union: 2030 targets for sustainable food production



Source: European Commission

Summary of market drivers – 'force field' analysis

External forces influencing the development of Biological Control Agents

Social	• SPS limitations (macrobials) • Organic farming, ESG, anti-pesticide sentiment
Technological	• Efficacy < conventional crop protection in some cases • New Ais, formulation advances, lower COGS
Economic	• High costs (e.g., pheromones) • Investment by 'Majors'/VC, supermarket standards, low residues/PHIs cost reduction
Environmental	• Resistance • Global warming
Political	• Fast track registration • Pressures on conventional crop protection agricultural policy (e.g., F2F)

Source: IHS Markit

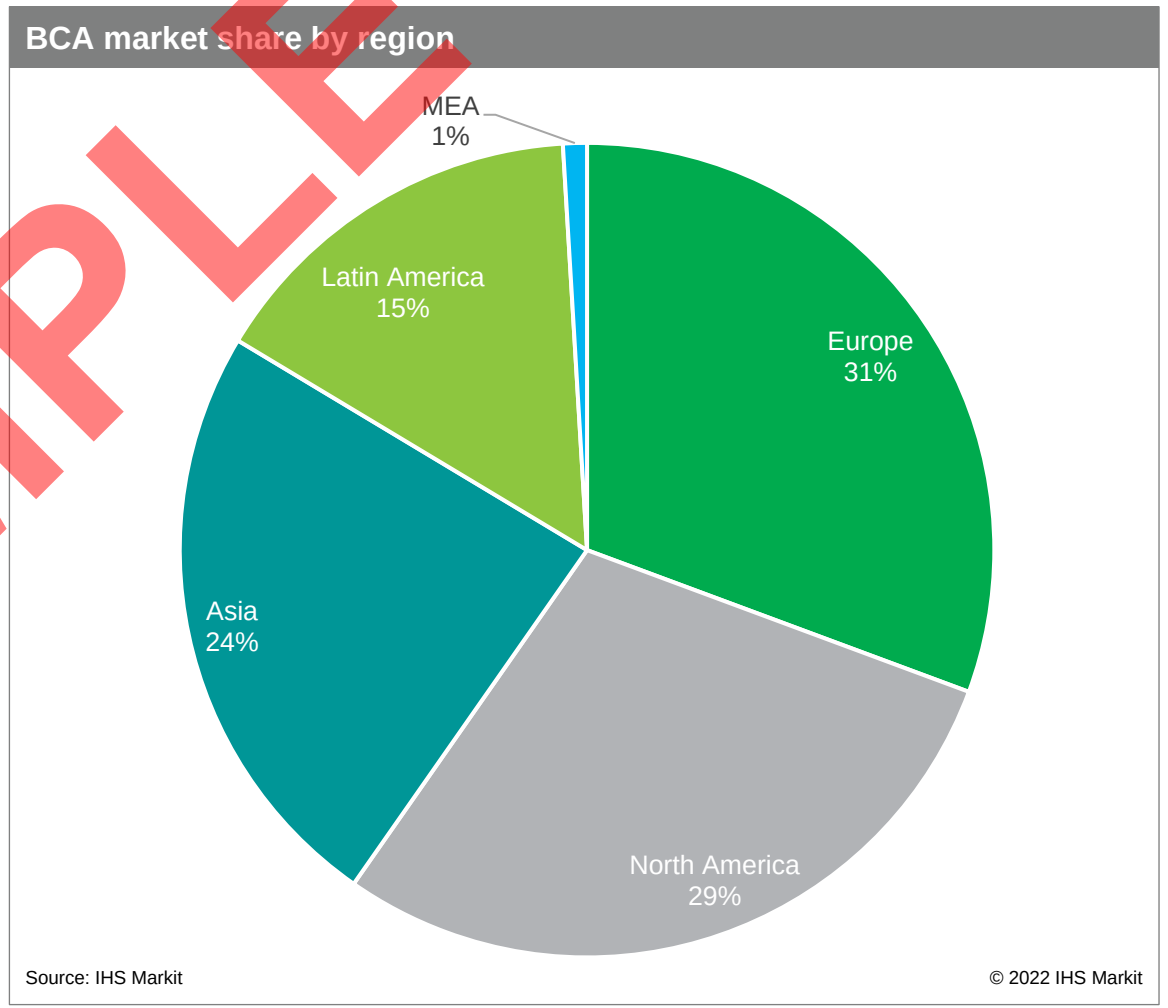
Regional markets overview

Europe and North America each account for around one third of the biopesticides market, followed by Asia and Latin America, with 20% and 15% respectively. The Middle East and Africa (MEA) accounts for just one per cent of the global market.

The number of companies based in each region follows the same proportions:

- Europe – 185 companies
- N America – 170 companies
- Asia – 95 companies
- Latin America – 90 companies
- Middle East and Africa – 25 companies

Each region is analysed in more detail in the following slides.

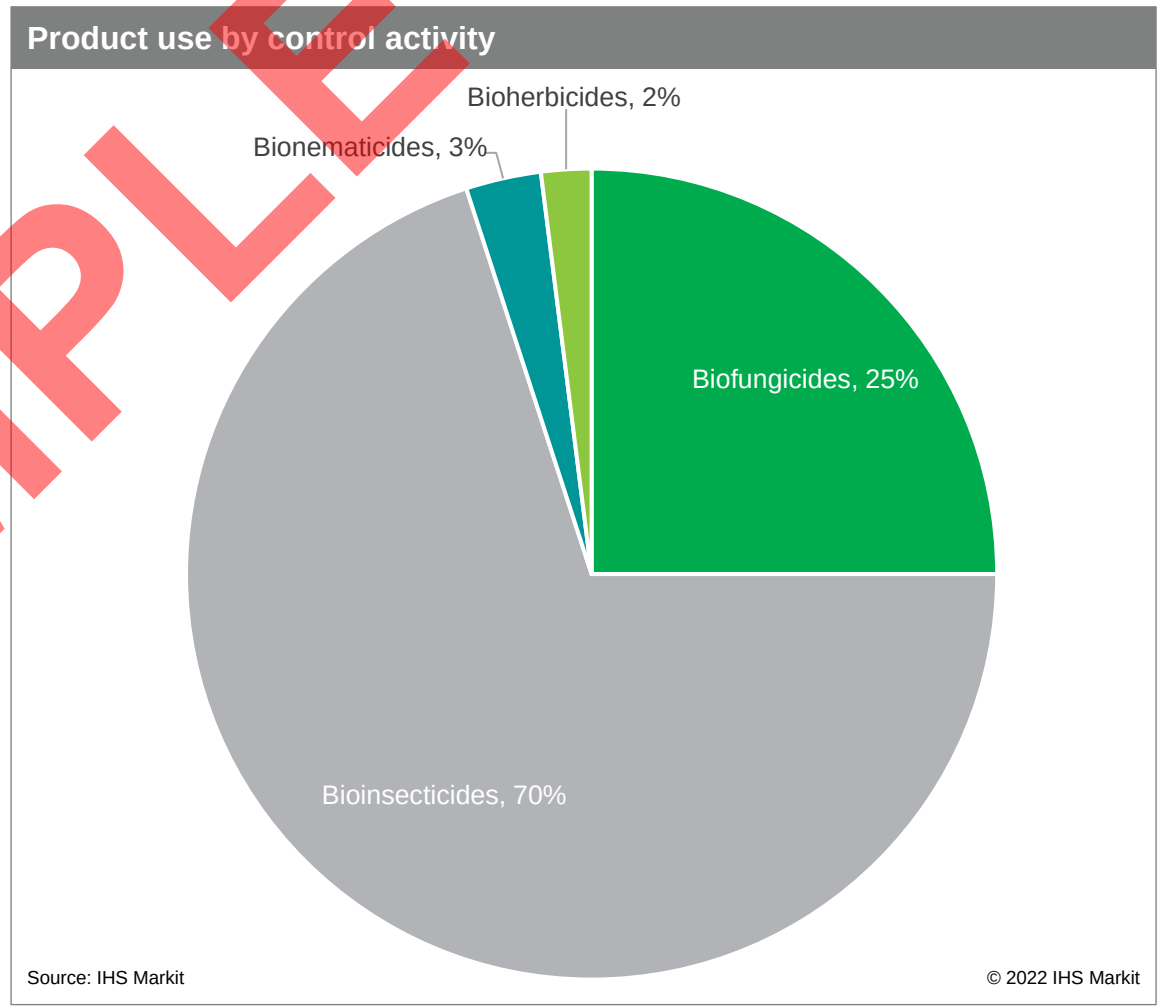


Product sector by usage type

As discussed earlier, whilst macrobials, viruses and pheromones are used exclusively for insect control, some bacteria, fungi and plant extracts can exhibit biological activity against both insects and plant diseases. It is therefore difficult to know how to apportion their usage without conducting primary market research.

However, from an analysis of regulatory and label data, combined with product sales it is possible to estimate usage according to target outlet.

It is estimated that 70% of BCA usage is for insect control, 25% for disease control, 3% for nematode control and 2% for weed control.

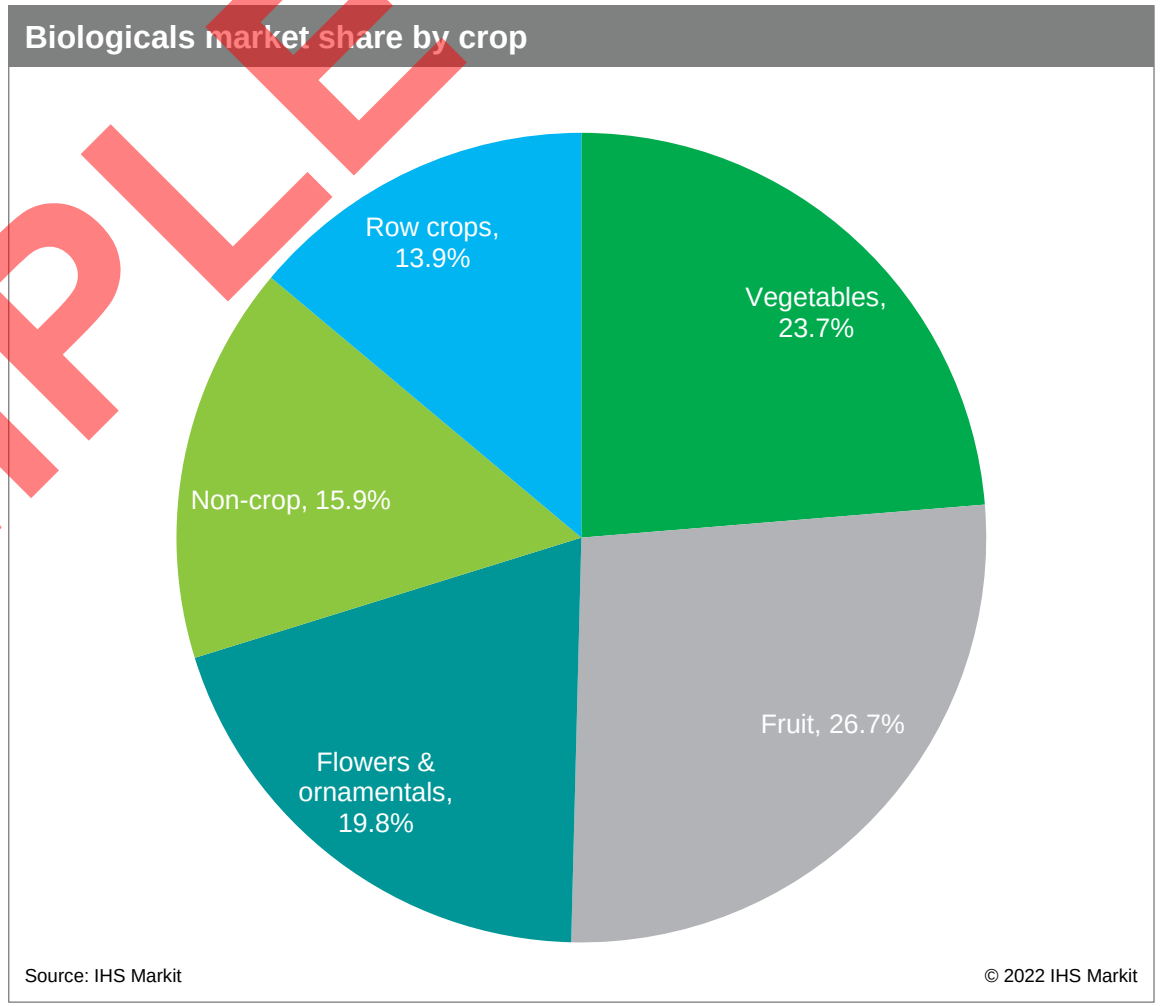


Overview and market share

70-80% of use of BCA use by sales is on the fruit and vegetables, flowers and ornamentals sector. There are several reasons for this:

- There is a significant protected crops sector (glasshouses and covered crops) in which use of BCAs is common
- Yields and profitability tend to be higher than in row crops so the sector can support products which tend to me more expensive
- IPM is more prevalent in the fruit and vegetables market

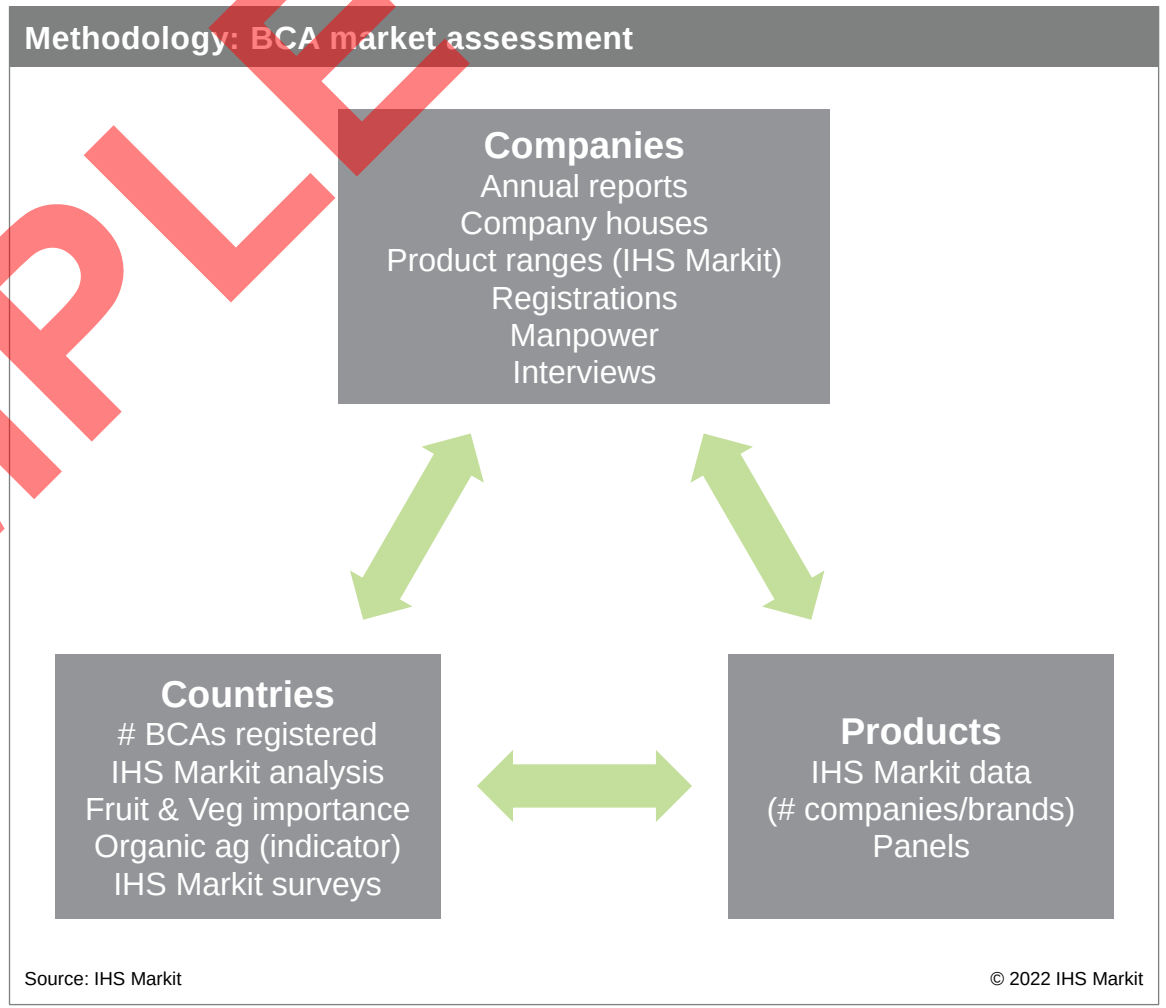
However there is a high level of use on specific row crop sectors – e.g. Brazilian soybean and sugar cane – and an increasing number of products are being developed for row crops with advances in the technology and production processes.



Methodology

The key to providing a realistic assessment of a market where data are so elusive is to triangulate various sources, and put the estimates in the context of data where there is more confidence. The three dimensions used to triangulate the data for BCAs are, in order of increasing confidence:

- Company sales data from various sources. A few of the 'majors', such as Syngenta and BASF, have recently started to publish their biologicals sales. This is indicative of the strategic importance they ascribe to them, even though sales are small by the standards of the conventional products. However, most companies are relatively small and also privately owned so they have no obligation to publish. In these cases their sales data may be available from their local 'Companies Houses'. Where it is not, it is possible to make estimates by looking at their product range, resources, etc. using IHS Markit's Biologicals Market Data
- Product sales estimates are obtained from IHS Markit's Biologicals Market Data for the larger products which are sourced from panel data and market surveys. The database can also be used for product analysis as it currently covers 1,600 actives, 5,500 brands and over 500 companies. For example the number of companies producing and marketing a particular AI and the number of brands available for this AI can be used as one indication of the product size
- Country market sizes can be benchmarked against the overall value of the crop protection market and the relative importance of the fruit and vegetable sectors in each country, both of which are available from IHS Markit's Crop Science Market Analysis. For some countries specific BCA surveys are also available (e.g. for Brazil)



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