



Japan Biopesticides Top 50 Companies **2016:**

**Market volume and value; Registration and approval processes;
New products and pipeline; Company profiles**

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Executive Summary

Biopesticides are narrowly classified in Japan as pesticides containing living organisms such as micro-organisms and natural enemies. This report adopts a broader definition and covers additional product types, including: antibiotics containing pesticidal substances produced by microbials; microbials based on dead organisms such as killed *Bacillus thuringiensis*; plant extracts; natural safe substances; and pheromones. Biostimulants that encourage plant growth are not included in this report.

Biopesticides occupy a niche market in Japan. They have to go through a similar registration process to conventional agrochemicals, with the result that they cannot offer commercial benefits such as faster approval times or reduced data requirements. However, marketing benefits commonly cited include the lack of problems with pest resistance or pesticide residues.

Using the narrow definition of products based on living organisms, biopesticide sales in Japan are some ¥2,300 million (US\$19 million), or just 0.6% of the total pesticide sales in the country. Adding in other product types, such as antibiotics, increases this to around ¥24,000 million (US\$199 million), or some 6% of the market. However, this sales figure is not of pure antibiotics, as they are formulated with other chemical pesticides.

Antibiotics dominate the biopesticide sector because they can be used under the same conditions as chemical pesticides. They are well accepted in pre-mixture formulations of insecticides and fungicides, particularly those for use on rice. Naturally occurring substances and plant extracts are the next largest sector in terms of sales. Many products in this group are used against greenhouse pests. They have the advantage of not requiring the establishment of maximum residue limits or pre-harvest intervals. Pheromones are the next major sector and are used to control fruit pests. Japan is a global leader in the production of pheromones.

Sales of microbial-based bioinsecticides are dominated by *Bacillus thuringiensis* for use against lepidopteran pests, although sales growth has been held back by severe competition from chemical pesticides and high prices for farmers. The most popular microbial fungicide products are based on *Bacillus subtilis* to control powdery mildew and grey mould in greenhouse crops.

In the biopesticide sector, excluding antibiotics, Idemitsu Kosan is the leading company in terms of sales. Its key products are pheromones to control fall webworms, and microbial fungicides. Shin-Etsu is also an important manufacturer of pheromones. Arysta LifeScience, part of US-based Platform Specialty Products, is a key supplier of natural enemies, while Kyowa Hakko has significant sales of natural safe substances. Sumitomo Chemical is a significant player in the *Bt* insecticide sector.

Antibiotic pesticides are distributed and sold in the same way as chemical pesticides, and sales of these products are dominated by the major agrochemical companies. Syngenta, Hokko Chemical, Sumitomo Chemical, Mitsui Chemicals Agro and Bayer CropScience lead this sector.

In this report

This report presents sales information for the biopesticide market in Japan, including the leading products and companies. It describes registration procedures and the data requirements for biopesticide approvals. The leading 51 companies are listed, together with company profiles providing sales of key products.

Yen to US dollar conversions use the 2015 annual average exchange rate of 0.0083.

The information in this report was compiled by Seiji Takamura of Joy Consulting Ltd. It was edited by Jackie Bird, contributor, Agrow World Crop Protection News.

Table 1: Sales of biopesticides by category 2008-14 (¥ million ex-works)

Product	2008	2009	2010	2011	2012	2013	2014
Antibiotic fungicides	8,479	8,578	7,919	8,082	8,129	8,193	8,382
Antibiotic insecticides	11,185	9,583	9,170	9,494	9,400	9,794	9,313
Microbial fungicides	798	846	846	702	722	720	708
Microbial herbicides	2	1	0	0	0	0	0
Microbial insecticides (excl <i>Bt</i>)	162	176	167	168	160	127	116
Microbial insecticides (<i>Bt</i>)	1,011	789	731	572	561	547	564
Natural enemies	377	504	524	640	820	1,003	926
Natural safe substances incl plant extracts	1,499	1,770	2,047	1,777	2,079	2,345	2,292
Pheromones	1,470	1,264	1,055	1,033	1,001	1,586	1,430
Total microbials & natural enemies	2,350	2,316	2,268	2,082	2,263	2,397	2,314
% of total pesticide sales	0.6	0.6	0.6	0.6	0.6	0.6	0.6
All biopesticides	24,983	23,511	22,459	22,468	22,872	24,315	23,731
% of total pesticide sales	6.9	6.4	6.3	6.3	6.3	6.5	6.2
Total pesticides	364,175	365,206	354,199	355,010	361,957	371,650	382,116

1.2 History of the market

The first biopesticide on the Japanese market was an emulsifiable concentrate formulation of the insecticide, pyrethrins, in 1948. This was followed by: the antibiotic fungicide, oxytetracycline, and the bactericide, streptomycin, in 1957 from the Zoetis Japan predecessor, Pfizer; kasugamycin in 1967 from Hokko Chemical; polyoxine in 1968 jointly from Kaken Pharmaceuticals, Kumiai Chemical and Nihon Nohyaku; and validamycin in 1972 from Sumitomo Chemical. The first antibiotic insecticide was milbemectin in 1990 from Mitsui Chemicals. This was followed by the development of many macrocyclic lactone insecticides, and these are used in rice production and horticulture (see Table 2).

Japan is a leading producer of pheromones. The first one, methyl eugenol, was developed by Sankei Chemical in 1969.

The first microbial biopesticide to be registered was *Bacillus thuringiensis* in 1981 by Toa Gosei, since transferred to OAT Agrio. Commercial development of microbial products started to increase after the 1990s, with an increase in research and development activity after the 2000s.

Antibiotics dominate the biopesticide sector because they can be used under the same conditions as chemical pesticides. They are well accepted in pre-mixture formulations of insecticides and fungicides, particularly those for use on rice. Some 77% of antibiotics are used in pre-mixtures, while 23% are used as straight formulations.

Pheromones are the next largest sector, with 106 registered products (19%), based on 36 ais, followed by natural enemies, with 51 products (9%) based on 22 organisms (see Table 3).

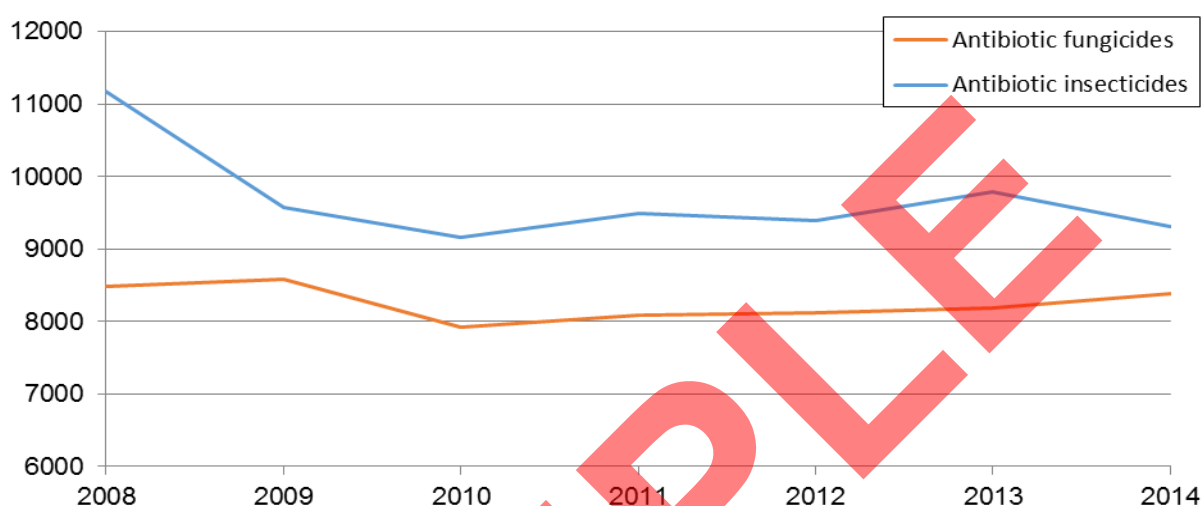
Table 3: Registered biopesticide products by ai as at October 2015

Ais & classification	Number of ais	First registration	Number of products
<i>Antibiotic fungicides</i>	7	Sept 1957	227
oxytetracycline		Sept 1957	4
streptomycin sulfate		Sept 1957	18
kasugamycin		Jan 1966	67
polyoxins		June 1968	13
validamycin		May 1972	95
polyoxin D zinc salt		April 83	13
oxolinic acid		Feb 1989	17
<i>Antibiotic insecticides</i>	7	Nov 1990	62
milbemectin		Nov 1990	6
nemadectin		Sept 1996	1
emamectin benzoate		Dec 1997	9
spinosad		April 1999	33
lepimectin		May 2010	2
spinetoram		March 2011	9
abamectin		Feb 2013	2
<i>Microbial fungicides</i>	14	Dec 1989	33
<i>Agrobacterium radiobacter</i> strain 84		Dec 1989	1
<i>Erwinia carotovora</i>		July 1997	3
<i>Bacillus subtilis</i>		Dec 1998	14
<i>Trichoderma atroviride</i>		Jan 2003	3
<i>Pseudomonas fluorescens</i>		Aug 2005	1
<i>Bacillus simplex</i>		Dec 2006	1
<i>Talaromyces flavus</i>		March 2007	3
<i>Coniothyrium minitans</i>		June 2007	1

1.4 Antibiotics

Antibiotics are the largest sector of the biopesticide market and sales have remained fairly constant over the last few years, at just over ¥9,000 million for antibiotic insecticides and just over ¥8,000 million for antibiotic fungicides (see Figure 2). They are well accepted by distributors and farmers, and are used in straight products or in mixtures with chemical pesticides.

Figure 2. Sales of antibiotics 2008-14 (¥ million ex-works)



In the fungicide sector, kasugamycin and validamycin have been important antibiotics for rice blast control for many years (see Table 4). Oxolinic acid is commonly used against bacterial diseases in rice and horticulture. Streptomycin is used in straight products or in mixtures with oxolinic acid. Polyoxin is used against powdery mildew and grey mould in horticulture.

Table 4: Sales of antibiotic fungicides by ai 2008-14 (¥ million ex-works)

Active ingredient	2008	2009	2010	2011	2012	2013	2014
kasugamycin	2,237	2,623	1,907	2,013	2,067	2,096	2,179
kasugamycin + oxolinic acid	111	123	142	146	164	173	191
kasugamycin + validamycin	573	435	447	372	369	310	294
oxolinic acid	1,330	1,330	1,399	1,396	1,432	1,439	1,417
oxytetracycline	854	809	685	819	920	827	873
polyoxin D zinc salt	72	111	133	136	141	211	148
polyoxins	669	734	606	606	550	655	648
streptomycin sulfate	485	574	630	661	584	578	595
streptomycin sulfate + oxolinic acid	119	121	123	137	119	116	111
validamycin	2,029	1,719	1,847	1,796	1,783	1,788	1,926
Total	8,479	8,579	7,919	8,082	8,129	8,193	8,382

Table 8: Sales of natural enemies by ai (¥ million ex-works)

Product and use	2008	2009	2010	2011	2012	2013	2014
<i>Amblyseius californicus</i> for spider mites on vegetables, fruit, ornamentals	46.3	92.2	97.5	111.6	151.1	172.3	104.4
<i>Amblyseius cucumeris</i> for thrips on vegetables, ornamentals	17.0	14.8	6.6	4.8	4.2	5.6	5.8
<i>Amblyseius swirskii</i> for thrips, whiteflies, spider mites on vegetables, potatoes	0	59.2	138.1	220.4	302.5	347.4	379.0
<i>Aphelinus asychis</i>	0	0	0	0.8	1.0	1.2	0.5
<i>Aphidius colemani</i> for aphids on vegetables	18.5	51.7	25.9	29.6	31.4	32.0	31.0
<i>Aphidius aphidimyza</i> for aphids on vegetables	2.8	1.9	1.8	1.4	1.4	0	0
<i>Bathyplectes anurus</i> for alfalfa weevil on Chinese milk vetch	0	0	0	0	0	0	0
<i>Chrysoperla carnea</i> for aphids on vegetables	0.4	0	0	0	0	0	0
<i>Dacnusa sibirica</i> for leafminers on vegetables	0.1	0.3	0	0	0	0	0
<i>Diglyphus isaea</i> for leafminers on vegetables	0.9	2.3	1.5	1.5	1.6	0.9	0.7
<i>Diglyphus isaea</i> + <i>Dacnusa sibirica</i> for leafminers on vegetables	3.2	3.5	6.9	3.7	3.5	0	0
<i>Encarsia formosa</i> for whiteflies on vegetables	30.3	25.4	17.7	13.7	19.4	21.4	21.4
<i>Eretmocerus eremicus</i> for whiteflies on vegetables	21.9	15.0	5.8	4.4	3.8	3.2	4.3
<i>Eretmocerus mundus</i> for whiteflies on vegetables	10.3	0	0	0	0	0	0
<i>Franklinothrips vespiformis</i> for thrips on vegetables	0.6	0.3	0.1	0.3	0.1	0.4	0.3
<i>Harmonia axyridis</i> for aphids on vegetables	2.8	3.8	4.6	3.4	3.8	3.9	6.1
<i>Neochrysocharis formosa</i> for leafminers on vegetables	0.4	0.8	2.0	0	0.3	1.0	1.2
<i>Orius strigicollis</i> for thrips on vegetables	96.1	115.7	114.2	114.6	114.1	109.7	109.7
<i>Phytoseiulus persimilis</i> for spider mites on vegetables	125.6	117.2	101.3	130.0	182.3	304.3	260.5
<i>Propylea japonica</i> for aphids on vegetables	0	0	0	0	0	0	1.5
Total	377.2	504.1	524.0	640.2	820.5	1,003.3	926.4

3. Company profiles

3.1 Leading companies

The analysis of leading companies is presented for two sectors, which separate out antibiotics from other biopesticides. Antibiotics are formulated as mixtures with chemical pesticides and sold by agrochemical companies. This results in larger sales figures, which are inflated by the chemical pesticide component. For similar reasons, *Bt*-based insecticides are separated out from other microbial insecticides, because of their dominance of that sector.

In the biopesticide sector, excluding antibiotics, Idemitsu Kosan is the leading company in terms of sales to September 2014 (see Table 12). Its key products are pheromones to control fall webworms, and microbial fungicides. Shin-Etsu is also an important manufacturer of pheromones. Arysta LifeScience, part of US-based Platform Specialty Products, has introduced and developed natural enemies in the Japanese market. Kyowa Hakko has significant sales of natural safe substances. Sumitomo Chemical is a leading producer and distributor of *Bt* insecticides.

Table 12: Biopesticide sales by company 2014 (¥ 000)

Company	Microbials			Natural enemies	Natural safe substances	Pheromones	Total
	Fungicides	Insecticides (excl <i>Bt</i>)	Insecticides (<i>Bt</i>)				
Idemitsu Kosan	388,292	33,029				400,000	821,321
Shin-Etsu						802,313	802,313
Arysta LifeScience	4,502	81,723	7,721	698,967			792,913
Kyowa Hakko Bio					783,605		783,605
Sumitomo Chemical			209,513	40,042	97,833	96,372	443,760
Sumitomo Chemical Garden Products			2,457		361,046		363,503
Fumakilla					290,761		290,761
Sankei Chemical			4,253		140,250	70,663	215,166
OAT Agrio			57,517		143,515		201,032

Each of the following company profiles give a total figure for pesticide sales in Japan. This is based on the latest company data from JMAFF for 2014. The figure represents sales to farmers and other end-users, and excludes technical sales to distributors and exports.

3.2 Abion Corporation

3-6-11 Noge

Setagaya-ku

Tokyo 158-0092

Tel: +81 3 6432 3401

Website: <http://www.abion.jp>

Total pesticide sales in Japan: ¥5.3 million

Total biopesticide sales (% of total): ¥5.3 million (100%)

Abion was established in 1970 and its business covers fertilisers and agriculture-related products. Its only pesticide product is the paraffin-based Abion-C, which reduces evaporation in turf and rice (see Table 14).

Table 14: Abion's biopesticide sales (¥ 000 ex-works)

Product	Trade name	Type/use	2012	2013	2014
paraffin	Abion-C	plant growth regulator	6,361	6,648	5,276

3.3 Agri-Soken

2629-1 Numata

Inashiki, Ibaraki prefecture 300-0506

Tel: +81 29 840 5977

Website: <http://www.agrisect.com>

Total pesticide sales: ¥101 million

Total biopesticide sales (% of total): ¥101 million (100%)

Agri-Soken was established in 2004 to import bumble bees for pollination, and to import and manufacture natural enemies (see Table 15). Products are sold through the subsidiary, Agrisect.

on papayas, mangoes, citrus fruit, guava, green peppers and peaches (see Table 22). It also supplies the pheromone, Okimelanolure, to control *Melanotus okinawensis* in sugar cane.

Table 22: Daiichi Nohyaku's biopesticide sales (¥ 000 ex-works)

Product	Trade name	Type/use	2012	2013	2014
diazinon + methyl eugenol	Ichino Eugecide D	pheromone for fruit	22,864	22,391	39,210

3.11 Dainihon Jochugiku

1-4-11 Tosabori

Nishi-ku

Osaka 550-0001

Tel: +81 6 6441 0451

Website: <http://www.kincho.co.jp/kaisha/en/gaiyo/index.html>

Total pesticide sales in Japan: ¥75 million

Total biopesticide sales (% of total): ¥5.3 million (7%)

Dainihon Jochugiku sells products under the well-known Kincho trade name in the household insecticide market. Its first agricultural biopesticides were based on the natural insecticide, pyrethrins, and it sells an emulsifiable concentrate formulation for use against aphids and thrips in vegetables (see Table 23).

Table 23: Dainihon Jochugiku's biopesticide sales (¥ 000 ex-works)

Product	Trade name	Type/use	2012	2013	2014
pyrethrins	Kincho Jochugiku EC 3	insecticide for vegetables	4,922	8,116	5,315

3.12 Dow AgroSciences Japan

Tennoz Central Tower

2-2-24 Higashi

Shinagawa-ku

Tokyo 140-8617

Tel: +81 3 5460 2100

Website: <http://www.dowagro.com/jp/>

Total pesticide sales in Japan: ¥12,666 million

Total biopesticide sales (% of total): ¥749 million (5.9%)

3.50 Syngenta Japan

21st Floor, Office Tower X

1-8-10 Harumi

Chuo-ku

Tokyo 104-6021

Tel: +81 3 6221 1001

Website: <http://www.syngenta.co.jp>

Total agrochemical sales in Japan: ¥33,649 million

Total biopesticide sales (% of total): ¥3,541 million (10.5%)

Syngenta Japan was established in 2001, following the global merger of the agrochemical business of Novartis and AstraZeneca to form Syngenta. The company's agrochemical marketing and distribution subsidiary, Tomono Agrica, was fully integrated into Syngenta Japan by 2003. It is now the leading company in the Japanese agrochemical market.

In the biopesticide sector, most of Syngenta's sales are from antibiotics. It also sells products based on natural enemies (see Table 62).

Table 62: Syngenta Japan's biopesticide sales (¥ 000 ex-works)

Product	Trade name	Type/use	2012	2013	2014
emamectin benzoate	Affirm EC	insecticide	2,909,717	2,828,341	2,484,694
abamectin EC	Abid, Agrimech	insecticide	0	271,363	472,276
emamectin benzoate	Shot-one Two SL	insecticide	273,431	443,963	304,131
emamectin benzoate + lufenuron	Apiopro Flowable	insecticide	118,047	147,649	195,229
<i>Phytoseiulus persimilis</i>	Kaburidani PP	natural enemy	19,540	43,467	39,981
emamectin benzoate + thiamethoxam + difenoconazole	Gurdy SG, Hanayaka WSG	insecticide/fungicide	12,406	15,911	19,039
emamectin benzoate + thiamethoxam + difenoconazole	Gurdy AL	insecticide/fungicide	15,018	25,720	13,039
<i>Encarsia formosa</i>	Tsuyakobachi EF 30	natural enemy	315	5,640	11,403
<i>Diglyphus isaea</i>	Himekobachi DI	natural enemy	57	170	473
<i>Aphidius colemani</i>	Aburabachi AC	natural enemy	401	332	284
<i>Dacnusa sibirica</i>	Komayubachi DS	natural enemy	4	7	0