World Agricultural Pesticides

Industry Study with Forecasts for 2016 & 2021

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Table of Contents

EXECUTIVE SUMMARY

MARKET ENVIRONMENT

General ........................................... 4
World Economic Outlook ..................... 5
Recent Historical Trends ...................... 6
World Agricultural Land Usage .......... 17
World Agricultural Land Usage ............. 17

Agricultural Pesticide Demand ............ 117
Belgium ........................................ 121
France ........................................... 125
Germany ........................................ 125
Greece ........................................... 130
Italy ............................................. 135
Japan ............................................ 140
The Netherlands .............................. 145
Portugal ........................................ 150
Spain ............................................ 155
United Kingdom .............................. 160
Agrc. Western Europe Demand .......... 165
Austria .......................................... 169
Finland ........................................ 170
Ireland ......................................... 171
Switzerland ................................... 171
All Other Western Europe ................ 171

EASTERN EUROPE

General ........................................... 173
Agricultural Pesticide Demand ............ 175
Poland .......................................... 179
Romania ........................................ 184
Russia .......................................... 189
Ukraine ......................................... 195
Other Eastern Europe ...................... 200
Czech Republic ................................. 204
Hungary ....................................... 205
All Other Eastern Europe ................. 205

ASIA/PACIFIC

General ........................................... 206
Agricultural Pesticide Demand ............ 208
China .......................................... 211
India .......................................... 223
Indonesia ...................................... 229
Japan .......................................... 233
South Korea ................................... 239
Thailand ........................................ 244
Other Asia/Pacific ............................ 250
New Zealand ................................... 254
Pakistan ........................................ 255
Philippines ..................................... 255
All Other Asia/Pacific ....................... 255

AFRICA/MID EAST

General ........................................... 257
Agricultural Pesticide Demand ............ 259
South Africa .................................. 263
Turkey .......................................... 268
Other Africa/Mideast ......................... 273
Iran .............................................. 277
Nigeria .......................................... 279
Saudi Arabia .................................. 279
All Other Africa/Mideast ................... 279

INDUSTRY STRUCTURE

General ........................................... 281
Market Share .................................. 285
Industry Restructuring ....................... 290
Manufacturing Strategies ................... 292
Marketing ....................................... 295
Distribution .................................... 296
Research & Development ................... 297
Competitive Strategies ..................... 299
Cooperative Agreements ..................... 301

COMPANY PROFILES

Agrifund Incorporated ...................... 309
Agro-Kanesho Company .................... 312
Albaugh Incorporated ....................... 314
American Vanguard ......................... 316
Anysta LifeScience ......................... 320
Auriga Industries ............................ 325
BASF SE ....................................... 330
Bayer AG ....................................... 337
Bell Laboratories ................................ 346
Cargill Incorporated ......................... 348
Chemtura Corporation ....................... 350
Dow Chemical ................................ 353
Drexel Chemical ................................ 358
DuPont (EJ) de Nemours ................... 360
Fine Holdings ................................ 366
FMC Corporation ............................. 367
Hubei Sanonda ................................ 370
Isagro Spa ..................................... 371
Ishihara Sangyo Kaisha ..................... 374
Jiangsu Changlong Chemicals ............ 376
Company Limited ............................ 378
Jiangsu Kewei Group ....................... 379
Jiangsu Yangnong Chemical .............. 380
JingMa Chemicals ......................... 381
Land O’Lakes Incorporated ............... 382
Makhteshim Agan Industries ............. 385
Marubeni Corporation ...................... 389
McLaughlin Gormley King ................ 391
Mitsui & Company ........................... 393
Monsanto Company ......................... 397
Nantong Jiangshan Agrochemical & Chemicals ............ 401
Nippon Soda .................................. 404
Nufarm Limited .............................. 407
PBI/Gordon Corporation .................... 413
Schimm GMBH ................................. 416
Shenzhen Nopotion Agrochemicals ....... 418
Sichuan Leshan Fuhua Tongda Agro-Chemical ....... 419
Sinochem International ..................... 420
SIPCAM-DON Group ....................... 421
Southern Agricultural Insecticides ....... 423
Sumitomo Chemical ......................... 425
Suterra LLC ................................... 431
Syngenta AG .................................. 444
United Phosphorus ......................... 438
Zhejiang Wyuna Chemical ................. 444
Other Companies Mentioned in the Study .......... 445

List of Tables/Charts

EXECUTIVE SUMMARY

MARKET ENVIRONMENT

1 World Gross Domestic Product by Region ........ 12
2 World Population by Region .................. 14
3 World Nonurban Population by Region ......... 15
4 World Agricultural Output by Region .......... 17
5 World Agricultural Land Usage ............... 18

(continued on following page)
List of Tables/Charts

(continued from previous page)

Cht World Agricultural Land Usage by Crop, 2011 ... 20
Cht Leading Wheat Producing Countries, 2011 ........ 21
Cht Leading Corn Producing Countries, 2011 .......... 23
Cht Leading Rice Producing Countries, 2011 .......... 24
Cht Leading Pasture & Forage Countries, 2011 ...... 25
Cht Leading Soybean Producing Countries, 2011 .... 26

OVERVIEW

1 World Agricultural Pesticide Demand by Region 35
Cht World Agricultural Pesticide Demand by Region, 2011 .... 36
2 World Agricultural Pesticide Demand by Type ... 39
Cht World Agricultural Pesticide Demand by Type, 2011 .......... 40
3 World Agricultural Herbicide Demand by Region 42
Cht World Agricultural Herbicide Demand by Region, 2011 ... 43
4 World Agricultural Insecticide Demand by Region .......... 46
Cht World Agricultural Insecticide Demand by Region, 2011 ... 46
5 World Agricultural Fungicide Demand by Region 48
Cht World Agricultural Fungicide Demand by Region, 2011 ... 49
6 World Demand for Other Agricultural Pesticides by Region 51
Cht World Demand for Other Agricultural Pesticides by Region, 2011 .. 52
7 World Agricultural Pesticide Demand by Crop, 2011 ...... 54
Cht World Agricultural Pesticide Demand by Crop, 2011 .......... 54

NORTH AMERICA

1 North America: Key Indicators for Pesticide Demand........ 63
2 North America: Agricultural Pesticide Demand by Type ...... 65
3 United States: Key Indicators for Pesticide Demand ......... 69
4 United States: Agricultural Pesticide Demand by Type ...... 72
5 Canada: Key Indicators for Pesticide Demand ... 74
6 Canada: Agricultural Pesticide Demand by Type 76
7 Mexico: Key Indicators for Pesticide Demand .... 79
8 Mexico: Agricultural Pesticide Demand by Type 81

CENTRAL & SOUTH AMERICA

1 Central & South America: Key Indicators for Pesticide Demand .......... 84
2 Central & South America: Agricultural Pesticide Demand by Type ...... 86
Cht Central & South America: Agricultural Pesticide Demand by Country, 2011 .... 87
3 Argentina: Key Indicators for Pesticide Demand .......... 89
4 Argentina: Agricultural Pesticide Demand by Type .......... 92
5 Brazil: Key Indicators for Pesticide Demand .... 95
6 Brazil: Agricultural Pesticide Demand by Type .... 97
7 Chile: Key Indicators for Pesticide Demand ... 101

WESTERN EUROPE

1 Western Europe: Key Indicators for Pesticide Demand .......... 117
2 Western Europe: Agricultural Pesticide Demand by Type ...... 120
Cht Western Europe: Agricultural Pesticide Demand by Country, 2011 .......... 121
3 Belgium: Key Indicators for Pesticide Demand123
4 Belgium: Agricultural Pesticide Demand by Type .......... 125
5 France: Key Indicators for Pesticide Demand .... 127
6 France: Agricultural Pesticide Demand by Type .......... 130
7 Germany: Key Indicators for Pesticide Demand ........ 132
8 Germany: Agricultural Pesticide Demand by Type .......... 135
9 Greece: Key Indicators for Pesticide Demand . 137
10 Greece: Agricultural Pesticide Demand by Type .......... 140
11 Italy: Key Indicators for Pesticide Demand .... 142
12 Italy: Agricultural Pesticide Demand by Type .......... 145
13 The Netherlands: Key Indicators for Pesticide Demand .... 147
14 The Netherlands: Agricultural Pesticide Demand by Type .......... 149
15 Portugal: Key Indicators for Pesticide Demand .......... 152
16 Portugal: Agricultural Pesticide Demand by Type .......... 154
17 Spain: Key Indicators for Pesticide Demand .... 157
18 Spain: Agricultural Pesticide Demand by Type .......... 159
19 United Kingdom: Key Indicators for Pesticide Demand .... 162
20 United Kingdom: Agricultural Pesticide Demand by Type .......... 165
21 Other Western Europe: Key Indicators for Pesticide Demand .......... 167
22 Other Western Europe: Agricultural Pesticide Demand by Type & Country .......... 169

EASTERN EUROPE

1 Eastern Europe: Key Indicators for Pesticide Demand .......... 175
2 Eastern Europe: Agricultural Pesticide Demand by Type ...... 178
3 Poland: Key Indicators for Pesticide Demand. 181
4 Poland: Agricultural Pesticide Demand by Type .......... 184
5 Romania: Key Indicators for Pesticide Demand .......... 186
6 Romania: Agricultural Pesticide Demand by Type .......... 188
7 Russia: Key Indicators for Pesticide Demand . 191
8 Russia: Agricultural Pesticide Demand by Type .......... 194
9 Ukraine: Key Indicators for Pesticide Demand 197

ASIA/PACIFIC

1 Asia/Pacific: Key Indicators for Pesticide Demand .......... 208
2 Asia/Pacific: Agricultural Pesticide Demand by Type .......... 210
Cht Asia/Pacific: Agricultural Pesticide Demand by Country, 2011 .......... 211
3 Australia: Key Indicators for Pesticide Demand .......... 213
4 Australia: Agricultural Pesticide Demand by Type .......... 216
5 China: Key Indicators for Pesticide Demand .... 219
6 China: Agricultural Pesticide Demand by Type 223
7 India: Key Indicators for Pesticide Demand .... 225
8 India: Agricultural Pesticide Demand by Type 228
9 Indonesia: Key Indicators for Pesticide Demand .......... 231
10 Indonesia: Agricultural Pesticide Demand by Type .......... 233
11 Japan: Key Indicators for Pesticide Demand .... 236
12 Japan: Agricultural Pesticide Demand by Type239
13 South Korea: Key Indicators for Pesticide Demand .... 241
14 South Korea: Agricultural Pesticide Demand by Type .......... 243
15 Thailand: Key Indicators for Pesticide Demand .......... 246
16 Thailand: Agricultural Pesticide Demand by Type .......... 249
17 Other Asia/Pacific: Key Indicators for Pesticide Demand .......... 252
18 Other Asia/Pacific: Agricultural Pesticide Demand by Type & Country .......... 254

AFRICA/MIDEAST

1 Africa/Mideast: Key Indicators for Pesticide Demand .......... 259
2 Africa/Mideast: Agricultural Pesticide Demand by Type .......... 262
3 South Africa: Key Indicators for Pesticide Demand .... 265
4 South Africa: Agricultural Pesticide Demand by Type .......... 267
5 Turkey: Key Indicators for Pesticide Demand .... 270
6 Turkey: Agricultural Pesticide Demand by Type .......... 272
7 Other Africa/Mideast: Key Indicators for Pesticide Demand .......... 275
8 Other Africa/Mideast: Agricultural Pesticide Demand by Type & Country .......... 277

INDUSTRY STRUCTURE

1 World Agricultural Pesticide Sales by Company, 2011 .......... 283
2 Selected Acquisitions & Divestitures .......... 291
3 Selected Cooperative Agreements .......... 303

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Brazils to surpass US and become largest world market by 2016

The world agricultural pesticide industry has been transformed by several years of robust growth coupled with new environmental regulations and changing crop mix trends. Increased farming of biofuel crops and the use of genetically modified (GM) seeds caused pesticide sales in Argentina and Brazil to more than double between 2006 and 2011, with Brazil surpassing the US to become the largest market in the world. China became the fourth largest national market as rising pesticide production in the country improved domestic pesticide availability and facilitated sharply increasing utilization rates.

Going forward, growth in global formulated pesticide demand will return to more sustainable levels following strong gains from 2006 to 2011, with sales forecast to approach $59 billion in 2016. Significant opportunities will exist in Brazil, the US, China, and Argentina. Sales of pesticides in Brazil and Argentina will be aided by increasing demand for industrial feedstock crops and the use of more sophisticated farming techniques. The US will remain the second largest market, benefitting from its vast amount of cropland and pesticide use rates that are higher than the world average. Chinas growth will slow to a more sustainable level, but remain above average as growers make the change from older generic products to newer proprietary formulations.

Fastest growth to occur in developing countries

The fastest growth in pesticide demand is expected in developing countries in Eastern Europe, South America, and Asia. Growing production of rapeseed and cereal crops, along with improved farming techniques, will drive demand in Eastern Europe. Ukraine and Russia will offer strong growth potential due to their low utilization rates compared to other European countries. In contrast, demand growth in Western Europe, Japan, and South Korea will be weak, hindered by market maturity and already high use rates. A shift in product mix and the use of integrated pest management (IPM) techniques will restrain growth in Western Europe.

Most pesticides to continue evolving, raising prices

Herbicide resistance continues to be an issue and is driving demand for new formulations with multiple active ingredients, which will command higher prices going forward. While insecticide demand will benefit from the adoption of higher-priced, safer products, growth will be restrained by environmental concerns, the use of IPM techniques, and the popularity of insect-resistant crop varieties. Fungicide demand will be affected by two trends in product mixes: the switch to synthetic fungicides over commodities in developing regions; and the need for more sophisticated, effective products in developed nations.
Turkey: Agricultural Pesticide Demand

Demand in Turkey for agricultural pesticides is projected to increase from $140 million in 2011 to $425 million in 2016. Gains will be supported by increased consumption of insecticides and fungicides. Growth will be boosted by increasing agricultural productivity, projected gains in agricultural output with fairly minor changes to overall harvested cropland. Although agricultural pesticides continue to expand and new, higher-formulation products are more common in Turkey, growth in the agricultural pesticide market is marginally slower than the regional average, as Turkey is one of the most developed markets in the Africa/Mideast region. This is partially due to its large agricultural industry and level of affluence relative to the rest of the Africa/Mideast region, allowing for more investment in agricultural inputs like pesticides. Although Turkey is agriculturally advanced relative to other countries in the Africa/Mideast region, its pesticide market still has room to grow as the country has a lower use rate than most nations in Eastern Europe, which shares a comparable climate and crop mix with Turkey. Potential future membership in the European Union could also be a driver for growth, as admittance into the EU would also bring in the EU’s pesticide regulations, which would force Turkish farmers to switch to safer, higher-value pesticide products over hazardous, lower-priced alternatives.

The Turkish pesticide market consists of a fairly balanced array of pesticide products, with no single product type truly dominating the overall market. Insecticides are the largest product type, accounting for over one-third of total demand in 2011, as parts of the country have warmer, wetter climates. Insecticides are particularly important in Turkey’s high-value hazelnut and fruit industries. Fungicides, the largest product category, are also expected to show the fastest growth as specialty fungicides continue to be adopted by Turkish growers.
Sample Profile, Table & Forecast

Albaugh Incorporated
1525 Northeast 36th Street
Ankeny, IA 50021
515-964-9444
http://www.albaughinc.com

Annual Sales: $940 million (estimated)
Employment: 3,000 (estimated)
Key Products: off-patent herbicides, fungicides, insecticides, and plant growth regulators

Albaugh is a privately held formulator and producer of off-patent crop protection products. The Company’s products comprise various herbicides, fungicides, insecticides, and plant growth regulators.

The Company is active in the world agricultural pesticide industry through the production of herbicides, fungicides, insecticides, and plant growth regulators. Albaugh’s herbicides include glyphosate, oxyfluorfen, imazethapyr, clopyralid, picloram, quinclorac, dicamba, phenoxy, clethodim, trifluralin, propazine, 2-methyl-4-chlorophenoxyacetic acid, 2,4-dichlorophenoxyacetic acid, bromoxynil, triclopyr, and fomesafenv formulations. Specifically, the Company manufactures GLYSTAR glyphosate types used to kill weeds, grasses, and other unwanted plants in preplant burndown, pre-emergent, post-emergence, noncrop, post-harvest grain sorghum, and preharvest applications. Oxyfluorfen herbicides comprise OXYSTAR types that are safe for use on cotton and soybean crops, while imazethapyr herbicides are sold under the THUNDER MASTER brand name for pre-emergence use in protecting soybean crops, or post-emergence on ROUNDUP READY soybeans produced by Monsanto Company (US). Albaugh makes clopyralid herbicides in COMMANDO and COMMANDO-M formulations that

TABLE IX-6
TURKEY: AGRICULTURAL PESTICIDE DEMAND BY TYPE
(million dollars)

<table>
<thead>
<tr>
<th>Item</th>
<th>2001</th>
<th>2006</th>
<th>2011</th>
<th>2016</th>
<th>2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Harvested (mil hectares)</td>
<td>21.3</td>
<td>20.1</td>
<td>19.1</td>
<td>19.4</td>
<td>19.8</td>
</tr>
<tr>
<td>$ pesticide/hectare</td>
<td>6.6</td>
<td>12.4</td>
<td>17.3</td>
<td>21.9</td>
<td>26.8</td>
</tr>
<tr>
<td>Pesticide Demand</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herbicide</td>
<td>35</td>
<td>73</td>
<td>90</td>
<td>115</td>
<td>145</td>
</tr>
<tr>
<td>Insecticide</td>
<td>70</td>
<td>97</td>
<td>120</td>
<td>155</td>
<td>190</td>
</tr>
<tr>
<td>Fungicide</td>
<td>24</td>
<td>58</td>
<td>92</td>
<td>120</td>
<td>150</td>
</tr>
<tr>
<td>Other</td>
<td>11</td>
<td>22</td>
<td>28</td>
<td>35</td>
<td>45</td>
</tr>
<tr>
<td>% Turkey</td>
<td>15.1</td>
<td>18.5</td>
<td>18.4</td>
<td>18.2</td>
<td>17.8</td>
</tr>
<tr>
<td>Africa/Mideast Pesticide Demand</td>
<td>930</td>
<td>1350</td>
<td>1790</td>
<td>2330</td>
<td>2970</td>
</tr>
</tbody>
</table>

“Agricultural output accounted for over nine percent of Turkey’s total economic activity in 2011. Going forward, agricultural output is expected to grow 2.6 percent per year through 2016. Turkey’s climate provides a very favorable growing environment for wheat, which is the largest crop by land use. Other important crops include barley, olives, corn, grapes, cultivated pasture, and hazelnuts.”

--Section IX, pg. 269
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