ADJUVANT MARKET IN AGRICULTURE

BY TYPE [Activator (Surfactants, Oils, Ammonium Fertilizer), Utility (Water Conditioners, Drift Control, Compatible, Acidifier/buffers, Antifoam)],

BY APPLICATION (Herbicides, Fungicides, Insecticides)

— Global Trends & Forecasts to 2018
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1 INTRODUCTION

1.1 RESEARCH METHODOLOGY

1.1.1 KEY DATA POINTS TAKEN FROM PRIMARY SOURCES

- Market revenue, sales and expected growth trends
- New technical and commercial developments
- Price trends of pesticides and raw materials
- Potential developments in the regulatory structure
- New potential production processes and active ingredients

1.2 KEY QUESTIONS ANSWERED

- What are market estimates and forecasts, in terms revenue for agriculture adjuvants market?
- What and where are the opportunities? What factors are driving the market growth?
- Which are the key playing fields and winning-edge imperatives?
- Which are the sub markets, complementary market, and related market for agriculture adjuvants market?
- What are the competitive landscapes; who are the main players in the agriculture adjuvants market; what are their strategic directives, operational strengths? Who is doing what?
- What is the market demand of various types of adjuvants?
- What is the market size and forecast for key countries in North America, Asia-Pacific, Europe, Latin America, and Rest of the World?
2 EXECUTIVE SUMMARY

AGRICULTURE ADJUVANTS: MARKET REVENUE, BY GEOGRAPHY, 2011 – 2018 ($MILLION)

Source: MarketsandMarkets Analysis

The agriculture adjuvants market valued at $XX million in 2012 and expected to grow at a CAGR of XX% to reach $XX million by 2018. North America controlled the market share of around XX% in 2012. U.S leads the adjuvants market in North America. Europe market valued at $XX million in 2012 and projected to grow at a CAGR of XX% from 2013 to 2018. The agriculture adjuvants market is dominated by North America and Europe is mainly due to high tech agriculture practices, increasing awareness, protected and precision farming, and headquarters of major market players in these regions. Majority of the adjuvants market in Asia-pacific and Latin America is untapped and has huge potential to grow. The agriculture adjuvants market in this region is expected to grow at a CAGR of XX% for forecast period.
The global agricultural adjuvants market is fragmented and significantly price sensitive. Owing to high entry barriers, a number of market participants remain limited. Due to these factors, the market displays oligopolistic characteristics. The leading participants in innovation and patent registration such as Adjuvant plus Inc. (Canada), Akzonoble N.V. (Netherlands), Brandt Consolidated (U.S.), Clariant International Ltd. (Switzerland), Lamberti SpA (Italy), Momentive Performance Materials (U.S), Solvay SA (Belgium), Dow Croning (U.S.), Croda Chemicals (India), Tanatex Chemicals (Europe), Helena Chemical Company (U.S.) and others.
3 PREMIUM INSIGHTS

3.1 GLOBAL AGRICULTURE ADJUVANT MARKET

FIGURE 2

AGRICULTURE ADJUVANTS: MARKET REVENUE, BY GEOGRAPHY, 2012 – 2018 ($MILLION)

Source: MarketsandMarkets Analysis
3.2 NORTH AMERICA: LARGEST AGRICULTURE ADJUVANTS MARKET

Source: MarketsandMarkets Analysis

The North America agriculture adjuvants market is about to be a matured market and holds a key position, globally. Asia-Pacific and Latin America markets have a wide potential to grow as the demand is estimated to increase in coming years.
3.3 SURFACTANTS DOMINATES THE AGRICULTURE ADJUVANTS MARKET

Agriculture adjuvants are classified into two main segments as activator adjuvants and utility adjuvants. Activator adjuvants includes surfactants, oils, and ammonium fertilizers while utility adjuvants include antifoam agents, compatibility agents, drift control agents, acidifiers/buffers, water conditioners, and others. Surfactants hold a key position in agriculture adjuvants market and has wide utility in products.
3.4 NORTH AMERICA AGRICULTURE ADJUVANTS MARKET IS MATURED

FIGURE 5

AGRICULTURE ADJUVANTS: MARKET LIFE CYCLE, BY GEOGRAPHY, 2012

Source: MarketsandMarkets Analysis

North American agriculture adjuvants market is a matured market. The Asia-Pacific and Latin America markets are at growing stage and estimated to grow at a CAGR of XX% from 2013 to 2018.
3.5 HERBICIDES: MOST PREFERRED APPLICATION OF AGRICULTURE ADJUVANTS

Source: MarketsandMarkets Analysis

Agriculture adjuvants market by applications is led by herbicides, which valued at $XX million in 2012 and anticipated to grow at a CAGR of XX% to reach $XX million by 2018. Fungicides and insecticides market are likely to grow at a CAGR of XX% and XX% from 2013 to 2018.
4 MARKET OVERVIEW

4.1 MARKET STATISTICS

4.1.1 SUBMARKET

4.1.1.1 Surfactants Market

Surfactants are widely preferred chemicals in the specialty chemical industry. Adsorption property, which helps to stabilize the rapidly formed bubbles during foaming, emulsification or coating processes, surface reducing properties, flocculation, biocide nature, etc. are few major reasons for popularity of surfactant usage. Also, because of elasticity and viscosity of the surfactant layer, which gives stability to foam or emulsion, surfactants have gained popularity in different application segments. The global industry for overall surfactants is expected to grow at the promising rate. Currently, synthetic surfactants are more popular all over the globe, and it is estimated that their consumption would show a steady growth in recent future. However, the bio-based surfactants market that is still in its nascent stages would grow at the promising growth rate that will be higher than the growth rate of the synthetic surfactants. This growth could be articulated with the facts like increasing awareness towards environmental factors, volatile petroleum prices, regulatory constraints, which would get more stringent in future, availability of wide variety of substrates required for the synthesis of bio-based surfactants, etc.
FIGURE 7

SURFACTANT: MARKET REVENUE ($MILLION) & MARKET VOLUME (KILOTONS), 2012

Source: Industry Associations, Expert Interviews, MarketsandMarkets Analysis
5 MARKET ANALYSIS

5.1 INTRODUCTION

The agriculture adjuvants market is one of the growing sub segments of agrochemical market, which contributes around XX% to XX% of the crop protection chemicals market. The agriculture adjuvants market is broadly classified into two major types as activator adjuvants and utility adjuvants. Adjuvants are complementary with agrochemicals so the increase in consumption of agrochemicals stimulates the adjuvants market as well. The adoption of precision farming and increasing area under protected cultivation is increasing at a higher pace and is one of the driving factors for adjuvants market. The shrinking arable land, adoption of new technology, increasing willingness of farmer to spend more for higher productivity are few important factors, which rouse the demand for agriculture adjuvants.

The increasing environmental concern against use of agrochemicals, the residual effect of pesticides seen in plants, soil, water, etc. has riddled the demand of agrochemical and thus the adjuvants. The genetically modified seeds have inbuilt resistance against infestation of pest and diseases, few are tolerant to drought too. As a result, these require less agrochemicals and thus debilitate the use of adjuvants. In spite of the agriculture adjuvants playing a key role in crop production, it is not uniformly defined across the globe. There is indistinctness with respect to the definition, chemicals used as adjuvants, types, and the function of adjuvants, which varies across the globe.

The bargaining power of the suppliers is low as most of the manufacturers have in house production facility. The bargaining power of the buyers is medium as there are fewer branded adjuvant products with well-known compatibility. There is no threat of the substitutes as no product can replace adjuvants function. The agriculture adjuvants market is characterized by constantly changing consumer perception coupled with an unfavorable regulatory framework, price sensitivity, high expenditure, and intensive R&D in the market due to which the threat of new entrants is low. The agriculture adjuvants market is concentrated among the few market players. The major market players are BASF (Germany), Dow Croning (U.S.), Croda Chemicals (India), Akzonoble Agrochemicals (U.S.), Tanatex Chemicals (Europe), Helena Chemical...
company (U.S.), and few others. The degree of competition among the market players is medium.

5.2 MARKET DYNAMICS

AGRICULTURE ADJUVANTS MARKET: IMPACT OF MAJOR DRIVERS & RESTRAINTS, 2011 – 2018

Source: MarketsandMarkets Analysis
5.2.1 MARKET DRIVERS

5.2.1.1 Growing demand for agrochemicals worldwide

The crop protection chemicals market is the fastest growing segment of agrochemical market and primarily includes insecticides, fungicides, herbicides, fertilizers, etc. The crop protection chemicals market has grown exponentially in the last few years and growth is expected to continue. The adjuvants is a complementary segment that goes hand in hand with crop protection chemicals, fertilizers, micronutrients, plant growth regulators, etc. Agriculture adjuvants contribute around XX% to XX% of the global crop protection chemical market. Adjuvants are used with herbicides, fungicides, insecticides, etc. that facilitates their function and utility. Thus, the increasing sales of crop protection chemicals have stimulated demand for adjuvants and the trend is expected to continue.

FIGURE 9

CROP PROTECTION CHEMICALS: MARKET REVENUE, BY GEOGRAPHY, 2011 – 2018 ($MILLION)

Source: MarketsandMarkets Analysis
The global crop protection chemical market valued at $XX million in 2012 and expected to grow at a CAGR of XX% and reach $XX million market by 2018.

As adjuvants and crop protection chemicals go hand in hand, the crop protection chemicals market is expected to fuel the demand for agriculture adjuvants worldwide.

5.3 VALUE CHAIN ANALYSIS

Adjuvants can be manufactured from chemicals, petroleum products, and biological or renewable substrates as their raw materials for synthesis. Raw substrates - such as vegetable oils and oil wastes, polyglycerol and carbohydrate fatty acid esters sugar alcohols, starchy substrates, etc. - industrial wastes - such as dairy industry whey, animal fats, molasses, etc. - are the major substrates that are or can be used for the production of bio-based substrates. Traditionally, adjuvants are synthesized from petroleum-based products, using chemical processes, which make use of high temperature, and involve high acidity or alkalinity with organic solvents.

However, in the synthesis of chemically manufactured bio-based surfactants, the raw materials are used with green chemical processes where traditional chemical processes are replaced with enzymes. The type of enzymes and raw materials used would depend upon the desired final product. Most commonly used enzymes in these green chemical processes are lipases. In case of biosurfactants, the raw materials are inoculated with the microbial culture and fermented for
given period of time at a maintained temperature and pH conditions. Again, the strains of microbes, fermentation time, and substrates used would depend on the type of the biosurfactant required.

Once the chemically manufactured bio-based adjuvants are processed, they are recovered using different techniques or combination of techniques like centrifugation, low pressure pumping column, distillation, etc. However, advances in enzyme immobilization technology, recombinant DNA technology, and isolation of new extremophiles would be the future techniques for active and stable enzyme preparations. This would not only increase operational lifetime for enzymes but also help recovery of high value specialty adjuvants.

### 5.4 SUPPLY CHAIN ANALYSIS

Agriculture adjuvants are generally secondary products, which are used along with the agrochemicals such as herbicides, fungicides, insecticides, and fertilizers. Due to this, the supply chain for agriculture adjuvants is more or less same that of agrochemicals. Adjuvants are made up of chemicals especially named as surfactants, oils, and fertilizers.

**FIGURE 11**

**AGRICULTURE ADJUVANTS: SUPPLY CHAIN ANALYSIS**


The chemicals produced by raw material producers are in raw form that are further purified and treated according to the use, function, and application by adjuvants manufacturer. The products are further transported to distributor following the dealer, retailer, and then finally reached in hands of the farmers. Most of the companies having global presence follow the same supply chain.
5.5 PORTER’S ANALYSIS

**FIGURE 12**

**PORTER’S FIVE FORCES ANALYSIS**

- High number of suppliers
- High market concentration
- High degree of backward integration

- Limited branded products
- Consumer Perceptions

- High degree of market concentration
- High cost for product innovation
- High entry barriers

- No Substitute can meet the exact requirement
- Focus on innovation

Source: MarketsandMarkets Analysis
5.5.1 BARGAINING POWER OF SUPPLIERS

The agriculture adjuvants market is dominated by activator adjuvants that accounted for over XX% of the total market in 2012. Activator adjuvants includes surfactants, oils, and ammonium fertilizers which are generally manufactured from commodity or bulk chemicals such as silicon, gypsum, copper, Sulfonic acids, Ethoxylated alkyl amines and salts. During the production of adjuvants, these elements and bulk chemicals are treated to manufacture pre-cursors to molecules. These pre-cursors are mainly produced by the manufacturing company itself and are not sourced from other suppliers. Thus, prime raw material suppliers for this industry are mainly the suppliers of commodity chemicals and elements, which are present in high numbers in the market. Also, the agriculture adjuvants market is highly concentrated with key participants such as BASF (Germany), Dow Croning (U.S.), Croda Chemicals (India), Tanatex Chemicals (Europe), and Helena Chemical Company (U.S.). These companies, along with being manufacturers of bulk chemicals also offer the agriculture adjuvants products. Thus, a high degree of backward integration exists in the industry. Thus, bargaining power of the suppliers is low.
6 AGRICULTURE ADJUVANTS MARKET, BY TYPES

6.1 INTRODUCTION

Adjuvants are added in formulations or tanks to facilitate the mixing, effectiveness and application of that herbicide. Adjuvants are separately available in the market, to be mixed with agrochemicals to meet specific crop demands. These products improve the ability of solution to kill the targeted species without any harm to other plants. Adjuvants are classified based on their action and specific function needs to be facilitated. Activator adjuvants include surfactants, oils, and ammonium adjuvants. Utility modifiers include, buffering agents, compatibility agents, anti-foam agents, water conditioners, buffers/Acidifiers etc.

Activator adjuvants dominate the agriculture adjuvants market. Surfactants are one of the important adjuvants markets and are further classified as Ionic, cationic, nonionic, and amphoteric. Mostly non-ionic surfactants are used for agricultural adjuvants. Oils are further sub segmented as vegetable oils and petroleum oils. Oil adjuvants can increase the penetration of oil-soluble agrochemical into plants, and are commonly used when conditions are hot and dry, or when leaf cuticles are thick. Ammonium fertilizers used as adjuvants include urea-ammonium nitrates (UAN), ammonium sulphates, ammonium nitrates, and ammonium polyphosphates.

<table>
<thead>
<tr>
<th>Trade name</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blendex VHC</td>
<td>Helena</td>
</tr>
<tr>
<td>Combine</td>
<td>Riverside/Terra</td>
</tr>
<tr>
<td>AgroSpred 730</td>
<td>Momentive Performance Materials Inc.</td>
</tr>
<tr>
<td>Trade name</td>
<td>Manufacturer</td>
</tr>
<tr>
<td>---------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Sapogenat T grades</td>
<td>Clariant</td>
</tr>
<tr>
<td><strong>Drift Inhibitors</strong></td>
<td></td>
</tr>
<tr>
<td>Intac Plus</td>
<td>Loveland Industries</td>
</tr>
<tr>
<td>Spray-Start</td>
<td>Kalo Inc.</td>
</tr>
<tr>
<td>Strike Zone DC</td>
<td>Helena</td>
</tr>
<tr>
<td>Target NL</td>
<td>Agway</td>
</tr>
<tr>
<td>Windbreak</td>
<td>Riverside/Terra</td>
</tr>
<tr>
<td>Windcheck</td>
<td>Riverside/Terra</td>
</tr>
<tr>
<td><strong>Anti-foaming agents</strong></td>
<td></td>
</tr>
<tr>
<td>DeFoamer</td>
<td>Riverside/Terra</td>
</tr>
<tr>
<td>Foam Buster</td>
<td>Helena</td>
</tr>
<tr>
<td><strong>Buffers</strong></td>
<td></td>
</tr>
<tr>
<td>Ballast</td>
<td>Cenex/Land O'Lakes</td>
</tr>
<tr>
<td>Buffer P.S.</td>
<td>Helena</td>
</tr>
<tr>
<td>BS-500</td>
<td>Drexel</td>
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<tr>
<td>Combine</td>
<td>Riverside/Terra</td>
</tr>
<tr>
<td>Latron AG-44M</td>
<td>Rohm and Haas</td>
</tr>
<tr>
<td>Penetrator Plus</td>
<td>Helena</td>
</tr>
</tbody>
</table>

Source: ICIS, Agrow, EPA, primary Interviews, MarketsandMarkets Analysis
7 AGRICULTURE ADJUVANTS MARKET, BY APPLICATIONS

7.1 INTRODUCTION

Adjuvants are active materials that facilitate the functions of agrochemicals, improve the efficiency of pesticide formulations, or spray solutions. Adjuvants are already mixed in pesticide formulations as part of the product, or adjuvants are also separately sold in the market to be added to pesticide products in a tank mixes. Adjuvants can be classified according to their type of action, and application. Adjuvants play an important role in increasing the biological efficacy of agrochemicals. These materials can be added with herbicides, fungicides, insecticides, fertilizers, and others. The selection of an adjuvant depends on the specific need to facilitate with pesticide to be mixed. Adjuvants strongly manipulate the interactions with the pest and pesticide. Herbicides must always go into the leaf while fungicides and insecticides may need to go through the leaf. The physiochemical factors of an adjuvant such as spray retention, adhesion, spreading, wetting and systemic factors such as uptake rate of the active ingredient, decide the efficacy of a pesticide. The use of adjuvants in agriculture is economical and environment friendly. The application of adjuvants with pesticides is a part of pest management, which results improved customer satisfaction, environmental safety, human safety, and increased crop nutrition.

7.2 CROP PROTECTION CHEMICALS

The crop protection chemicals market covers various types of products being used in farms to safeguard crops, by controlling the population of organisms considered harmful or those that can potentially damage or adversely affect the growth of crops. Crop protection chemicals are mainly divided into pesticides, plant nutrients, and adjuvants.

Pesticides include both synthetic pesticides and bio-based pesticides, which are the largest market segment owing to their widespread use in bulk quantities. Adjuvants are essentially pharmacological or immunological agents used to modify or enhance the effect of other vaccines and drugs.
### TABLE 2

**PESTICIDES: AREA OF ACTION & BENEFIT, BY TYPES**

<table>
<thead>
<tr>
<th>Type</th>
<th>Area of action</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Herbicides</td>
<td>Unwanted herbs, shrubs, and diseased crops</td>
<td>Save time, cheaper than mechanical methods</td>
</tr>
<tr>
<td>Fungicides and bactericides</td>
<td>Combat fungus that spoils plants health</td>
<td>Used in small amounts, helps maintain crop quality</td>
</tr>
<tr>
<td>Insecticides</td>
<td>Insects, parasites, and spoiled residues of previous crops</td>
<td>Wide spectrum action, crop protection for a substantial time</td>
</tr>
</tbody>
</table>

Source: MarketsandMarkets Analysis

Among all pesticides, the herbicides form the largest segment and account for almost XX% of the share in terms of revenue in 2011. Insecticides and fungicides formulate the second and third largest segment of the global pesticides market with XX% and XX% market share in 2011 respectively. Insecticides are most widely used because insects and parasites cause the maximum damage to crops during cultivation. Insecticides are used in large volumes and they show their action for a longer period as compared to others. However, excessive use of any pesticide results in the development of chemical toxicity for humans, animals, and the environment, owing to soil leaching and water contamination. Overall, it is essential to use crop protection pesticides in appropriate quantity and time to minimize their adverse effects and to bring maximum benefits.
8 AGRICULTURE ADJUVANTS MARKET, BY GEOGRAPHY

8.1 INTRODUCTION

Historically, the global market for agriculture adjuvants has been dominated by North America, owing to superior product technology and high pesticide use per hectare cultivated area. However, the demand for agriculture adjuvants from North America is estimated to be stagnant in the coming years. This has been primarily due to a stringent regulatory framework. The Asia-Pacific and Latin America agriculture adjuvants markets have a wide potential to grow. The major part in these regions is still not being trapped by market players.

![Agriculture Adjuvants Market, by Geography, 2012](image)

**Source:** MarketsandMarkets Analysis

North America dominates the market contributing around XX% of the agriculture adjuvants market. U.S led the market in North America. Europe held the second position in agriculture adjuvants market, which accounts for XX% share in 2012. Germany, France, Italy, and U.K. are the major consumers of adjuvants. In spite of being a major consumer of agrochemicals,
the Asia-Pacific contributes only XX% of adjuvants consumption. This is because of the lack of awareness, fragmented land holding, traditional agriculture practices, and others. However, the market in this region is estimated to grow at a higher pace in the coming years. China, Japan, and Australia, are the major consumers of agriculture adjuvants. Latin America contributes around XX% of the market in which Brazil and Argentina are the leading nations. In ROW, South Africa holds the key position for agriculture adjuvants market.
9 COMPANY PROFILES

9.1 ADJUVANT PLUS INC.

9.1.1 PRODUCTS & SERVICES

<table>
<thead>
<tr>
<th>Product name</th>
<th>Application/Description</th>
</tr>
</thead>
</table>
| Wise Up Plus                       | • It consists of liquid glyphosate  
• It is a water soluble formulation of the active ingredient glyphosate  
• It also consists of surfactant to improve spray coverage and leaf penetration |
| N Tank                             | • It is a utility modifier that helps in conditioning water  
• It minimizes calcium caking in sprayers and buffering  
• spray water to keep the herbicide active ingredient intact  
• It is also used in pesticides or pesticides tank mix combinations |
| GLY-N-GO                           | • It is a new two part product containing Glyphosate Acid XX%  
• It is a N-GO water conditioner |
| ORACLE DICAMBA LIQUID HERBICIDE    | • It is a broadleaf weed control product  
• It helps in controlling weeds in cereals, corn, helps in reducing tillage  
• It can be tank mixed with other products such as 2,4-D, etc. |
<table>
<thead>
<tr>
<th>Product name</th>
<th>Application/Description</th>
</tr>
</thead>
</table>
| Hawkeye Power| • It is a dicamba herbicide  
                    • It can be tank mixed with other products such as 2,4-D, etc.  
                    • It helps in controlling weeds in cereals, corn, helps in reducing tillage |
| VMD 480      | • It is a dicamba herbicide for broadleaf weed control in postures, rangeland, etc.  
                    • It can be used in tank mixtures                                           |
| Reddy IT     | • It is a patented water conditioner and utility modifier  
                    • It also softens water, maintains the integrity of spray water  
                    • It widens the conditions for use of formulated glyphosate products     |

Source: Company Annual Report, Primary Interviews, Company Website, MarketsandMarkets Analysis

### 9.1.2 STRATEGY

The company in order to strengthen its presence in the adjuvant market for agrochemicals is developing agrochemical formulation aid composition that can be used in in-tank preparation of a bioactive and sprayable agrochemical or mixture of agrochemicals. Thus, these initiatives will help the company to strengthen its presence in the adjuvant market with applications in agrochemicals.

### 9.1.3 DEVELOPMENT

<table>
<thead>
<tr>
<th>Date</th>
<th>Approach</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2012</td>
<td>Received patent</td>
<td>Adjuvant Plus received Canadian patent for its N Tank product. N Tank helps the growers to enhance the performance of their herbicides by conditioning spray water that improves performance as well as herbicide penetration in weeds for maximum returns.</td>
</tr>
</tbody>
</table>
**Date** | **Approach** | **Description**
--- | --- | ---
March 2010 | Product development | Adjuvant Plus developed an agrochemical formulation aid composition. It is an agrochemical formulation aid composition to be used with technical acid non-formulated, partially formulated, or pre-formulated actives for in-tank preparation of a bioactive and sprayable agrochemical or mixture of agrochemicals.

Source: Company Annual Report, Primary Interviews, Company Website, MarketsandMarkets Analysis

### 9.1.4 SWOT ANALYSIS

**FIGURE 14**

**ADJUVANT PLUS: SWOT ANALYSIS**

- **Strengths**
  - Research activities and innovative products
  - Patented value added technologies

- **Weaknesses**
  - Lack of global business presence

- **Opportunities**
  - Strategic growth initiatives
  - Marketing and brand recognition

- **Threats**
  - High Competition
  - Lesser known brand at global level

Source: MarketsandMarkets Analysis
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