

MARKETS AND PROFITABILITY

Market Insights: Speciality Fertilizer - 2018

Slow Release and Control Release Fertilizers

December 2018



This Report was prepared by Nexant, Inc. ("Nexant"). Except where specifically stated otherwise in this Report, the information contained herein is prepared on the basis of information that is publicly available, and contains no confidential third party technical information to the best knowledge of Nexant. Aforesaid information has not been independently verified or otherwise examined to determine its accuracy, completeness or financial feasibility. Neither Nexant, Subscriber nor any person acting on behalf of either assumes any liabilities with respect to the use of or for damages resulting from the use of any information contained in this Report. Nexant does not represent or warrant that any assumed conditions will come to pass.

The Report is submitted on the understanding that the Subscriber will maintain the contents confidential except for the Subscriber's internal use. The Report should not be reproduced, distributed or used without first obtaining prior written consent by Nexant. Each Subscriber agrees to use reasonable effort to protect the confidential nature of the Report.

Copyright © by Nexant Inc. 2019. All rights reserved.



Contents

1	Executive Summary	1
2	Introduction.....	4
2.1	Overview.....	4
2.2	Slow Release Fertilizers	6
2.2.1	Urea Formaldehyde (UF)	6
2.2.1.1	Ureaform	6
2.2.1.2	Methylene Urea.....	6
2.2.1.3	Urea Formaldehyde Solutions	6
2.2.2	Isobutylidene Diurea (IBDU)	7
2.2.3	Urea-alcetaldehyde/cyclo diurea (CDU).....	8
2.3	Controlled Release Fertilizers	9
2.3.1	Polymer Coated Urea (PCU).....	9
2.3.1.1	Meister Products	10
2.3.1.2	Reactive Layer Coating.....	10
2.3.1.3	Multicote Products.....	10
2.3.2	Polymer Coated NPK	10
2.3.3	Sulphur Coated Urea (SCU)	11
2.3.4	Polymer Sulphur Coated Urea (PSCU).....	11
2.4	Nitrogen Stabilizers & Inhibitors	14
2.5	Fertilizer Grades	15
2.6	Benefits of Speciality Fertilizers	17
2.6.1	Reduced Nitrogen Loss and Improved Yields.....	17
2.6.2	Reduced Costs.....	19
3	Market Outlook	20
3.1	Global	20
3.1.1	Market Overview	20
3.1.2	Demand.....	22
3.1.2.1	Field Crops	25
3.1.2.2	Fruits and Vegetables	25
3.1.2.3	Turfs and Ornaments	26
3.2	Asia Pacific (Excluding China)	28
3.2.1	Demand.....	28
3.2.1.1	Field Crops	29
3.2.1.2	Fruits and Vegetables	30
3.2.1.3	Turfs and Ornaments	30
3.2.2	Supply	31
3.3	China	33
3.3.1	Demand.....	33
3.3.1.1	Field Crops	36
3.3.1.2	Fruits and Vegetables	37



3.3.1.3	Turfs and Ornaments	38
3.3.2	Supply	38
3.4	North America	41
3.4.1	Demand	41
3.4.1.1	Field Crops	43
3.4.1.2	Fruits and Vegetables	44
3.4.1.3	Turfs and Ornaments	46
3.4.2	Supply	49
3.5	South America	51
3.5.1	Demand	51
3.5.1.1	Field Crops	52
3.5.1.2	Fruits and Vegetables	53
3.5.1.3	Turfs and Ornaments	55
3.5.2	Supply	55
3.6	Western Europe	56
3.6.1	Demand	56
3.6.1.1	Field Crops	59
3.6.1.2	Fruits & Vegetables	62
3.6.1.3	Turfs and Ornaments	64
3.6.2	Supply	66
3.7	Central and Eastern Europe	68
3.7.1	Demand	68
3.7.1.1	Field Crops	69
3.7.1.2	Fruits and Vegetables	70
3.7.1.3	Turfs and Ornaments	71
3.7.2	Supply	71
3.8	Middle East	72
3.8.1	Demand	72
3.8.1.1	Field Crops	73
3.8.1.2	Fruits and Vegetables	73
3.8.1.3	Turfs and Ornaments	74
3.8.2	Supply	74
3.9	Africa	75
3.9.1	Demand	75
3.9.1.1	Field Crops	77
3.9.1.2	Fruits and Vegetables	77
3.9.1.3	Turfs and Ornaments	78
3.9.2	Supply	79
4	Cost Competitiveness	81
4.1	Cost Structure and Assumptions	81
4.1.1	Variable Costs	82
4.1.1.1	Feedstock Costs	82
4.1.1.2	Utility Costs	83



4.1.1.3	Co-product Credits	83
4.1.2	Direct Fixed Costs	84
4.1.3	Allocated Fixed Costs.....	85
4.1.4	Other Considerations	85
4.2	Delivered Cost Assumptions	86
4.2.1	Shipping Costs	86
4.2.2	Tariffs	87
4.3	Delivered Cost Competitiveness.....	88
4.3.1	Urea.....	88
4.3.1.1	Urea Plant Assumptions.....	88
4.3.1.2	Regional Competitiveness	88
5	Pricing	90
6	Market Summary	91
6.1.1.1	Short-term Influences	95
6.1.1.2	Monomer Consumption Forecasting	95

Appendices

A	Methodology	93
A.1	Market Dynamics Forecasting Methodology	93
A.1.1	Capacity Availability and Forecasting	93
A.1.2	End-Use Consumption Forecasting	93
A.1.2.1	End-Use Sector Growth	94
A.1.2.2	Penetration (New Application Growth).....	94
A.1.2.3	Downgauging and Recycling	95
A.1.2.4	Chain Inventory	95

Figures

Figure 1	Nutrient Release in “Ideal Fertilizer”	4
Figure 2	Urea Formaldehyde Fertilizers Nutrient Release Process	7
Figure 3	PCU Nitrogen Release Technology.....	9
Figure 4	Sulphur Coated Urea	11
Figure 5	Polymer Sulphur Coated Urea.....	12
Figure 6	Nitrogen Cycle	17
Figure 7	Ammonia Volatilization vs. Days after Fertilization.....	18
Figure 8	Yield Improvement with Controlled Release Fertilizer.....	18
Figure 9	Effect of Firing in PCU vs. Urea.....	19
Figure 10	Global Population Growth by Region	20
Figure 11	Global CRF and SRF Global by Region, 2018-e.....	23
Figure 12	Global CRF and SRF Consumption by End-Use, 2018-e	24
Figure 13	Asia Pacific (Excluding China) CRF and SRF Consumption by End Use, 2018-e	29
Figure 14	China Nutrient Consumption	34
Figure 15	China Distribution of Fertilizer Application in Agriculture.....	35
Figure 16	China CRF and SRF Consumption by End Use, 2018-e	36



Figure 17	Dynamics of NUE of Rice and Oilseed Rape in the different Fertilizer Treatments With Time During Seven Year Fertilization	36
Figure 18	Publications related to SRF/CRF issued, 2000-2016.....	40
Figure 19	North America CRF and SRF Consumption by End Use, 2018-e.....	43
Figure 20	Major Field Crop breakdown, U.S.	43
Figure 21	Response of Hamlin orange trees to CRF, Florida	45
Figure 22	Nutrient application rate in 18 hole golf course in the U.S.	47
Figure 23	Factors in Nutrient Use Reduction: 2006-2014	48
Figure 24	South America CRF and SRF Consumption by End Use, 2018-e	51
Figure 25	Sugarcane Yields with Thermo Potash, 2014	52
Figure 26	ICL's Agromaster vs. Urea N Loss	53
Figure 27	Brazil Fruit Production	53
Figure 28	Multicote Agri® treatment in Banana.....	54
Figure 29	E.U. Retail Sales Organic Products, 2011- 2015	57
Figure 30	Western Europe CRF and SRF Consumption by End Use, 2018-e.....	59
Figure 31	Agricultural Land Use Developments in EU, 2010-2030	60
Figure 32	EU Demand for Cereals	60
Figure 33	EU Food Crop Farming Pattern, 2013-2023	61
Figure 34	Maize Results Controlled Release Fertilizer	61
Figure 35	Improvement in Rice Yield with use of CRF	62
Figure 36	Global Tomato Production, 2009 - 2017	63
Figure 37	Fresh Market Potato	64
Figure 38	Poland Agricultural Production (2009 – 2013 average)	68
Figure 39	Central and Eastern Europe CRF and SRF Consumption by End Use, 2018-e	69
Figure 40	CRF Impact on Cabbage Yield.....	70
Figure 41	Middle East CRF and SRF Consumption by End Use, 2018-e	72
Figure 42	Multicote Field Trials Bell Pepper, Israel	73
Figure 43	Africa CRF and SRF Consumption by End-Use, 2018-e	76
Figure 44	Components of Delivered Cost to Market	82
Figure 45	Urea Delivered Cost to USGC.....	89
Figure 46	End-Use Consumption Drivers	94
Figure 47	Monomer Consumption Drivers.....	96

Tables

Table 1	Properties Selected SRFs and CRFs	13
Table 2	Controlled Release & Slow Release Fertilizer.....	15
Table 3	Benefits of CRF Over Urea in Rice.....	19
Table 4	Global Arable Land vs. Population	21
Table 5	Global CRF and SRF Consumption by End-Use	23
Table 6	Golf Courses Worldwide	26
Table 7	Golf Course Development Overview ⁽¹⁾	27
Table 8	Asia Pacific (Excluding China) CRF and SRF Consumption by End Use.....	29
Table 9	Major Producers of SRF and CRF in Japan.....	31



Table 10	China CRF and SRF Consumption by End Use.....	35
Table 11	China Major Producers SRF and CRF	39
Table 12	North America CRF and SRF Consumption by End Use	43
Table 13	North America SRF and CRF Major Producers	50
Table 14	South America CRF and SRF Consumption by End Use	51
Table 15	Western Europe CRF and SRF Consumption by End Use	58
Table 16	Western Europe Major Producers SRF and CRF	67
Table 17	Central and Eastern Europe CRF and SRF Consumption by End Use	69
Table 18	Middle East CRF and SRF Consumption by End Use	72
Table 19	Africa CRF and SRF Consumption by End Use.....	76
Table 20	Africa List of Suppliers CRF and SRF	79
Table 21	Kenya CRF and SRF Suppliers.....	80
Table 22	Feedstock Price Assumptions	83
Table 23	Utility Rates.....	83
Table 24	Wage Assumptions.....	84
Table 25	Capital Cost Location Factors	85
Table 26	Freight Costs to USGC	87
Table 27	Urea Plants Modelled	88
Table 28	Relative Pricing Specialty Fertilizers	90