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ENHANCED-EFFICIENCY FERTILIZERS: WORLD MARKET OVERVIEW

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Enhanced-Efficiency Fertilizers: World Market Overview

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Introduction

Introduction

Enhanced-Efficiency Fertilizers (EEFs) include slow-release fertilizers (SRFs) and controlled-release fertilizers (CRFs), both generally referred to as CRFs, as well as stabilized fertilizers, principally stabilized nitrogen fertilizers (SNFs).

Historically, EEFs have predominantly been used in nonfarm markets (golf courses and other professional turf, consumer lawn and garden fertilizers, professional lawn care and landscape maintenance, professional horticulture, and landscapers) and, to a lesser extent for certain high-value specialty agricultural crops (e.g., strawberries, citrus, vegetables).

However, recent technology advances have resulted in new manufactured CRF and SNF products that are cost-effective and viable for major agricultural crops such as corn, wheat, cotton, rice, and potatoes.

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Introduction (Continued)

In this presentation I will provide an overview of the current world market for manufactured CRFs by region and identify recent trends in the U.S. CRFs market. I will also identify leading suppliers of SNFs and N stabilizers by world region and note recent SNF market trends.

Abbreviations

ATS	Ammonium thiosulfate
CDU	Crotonylidene diurea
CRF	Controlled-release fertilizer
CRN	Controlled-release nitrogen
DCD	Dicyandiamide
DMPP	3,4-Dimethylpyrazole-phosphate
EEF	Enhanced-efficiency fertilizer
IBDU	Isobutylidene diurea
LCO	Lawn care operator

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Introduction (Continued)

Abbreviations (Continued)

LMC	Landscape maintenance contractor
N	Nitrogen
NBPT	N-(n-butyl) thiophosphoric triamide
PCF	Polymer- or resin-coated fertilizer
PCK	Polymer- or resin-coated potassium
PC-NPK	Polymer- or resin-coated NPK
PCU	Polymer- or resin-coated Urea
PCSCU	Polymer-coated, sulfur-coated urea
SCF	Sulfur-coated fertilizer
SCU	Sulfur-coated urea
SNF	Stabilized nitrogen fertilizer
SRF	Slow-release fertilizer
SRN	Slow-release nitrogen
UF	Urea-formaldehyde

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CRFs

CRFs

SUPPLIERS

LEADING NORTH AMERICAN SUPPLIERS OF MANUFACTURED CRFs

		Coated Fertilizers	
Manufacturer	**UF Products**	**Sulfur-Coated**	**Polymer-Coated**
Agrium Advanced Technologies	X	X	X
Lebanon Seaboard	X		
Turf Care Supply		X	
Scotts	X	X	X

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CRFs (Continued)

SUPPLIERS

LEADING WESTERN EUROPEAN SUPPLIERS OF MANUFACTURED CRFs

Company/Country	Urea Reaction Products: UF	Urea Reaction Products: IBDU	Coated Fertilizers (PCFs)
Aglukon			
Germany	X		X
BASF[a]			
Belgium		X	
Germany		X	
Compo			
Germany		X	X

CRFs (Continued)

SUPPLIERS

LEADING WESTERN EUROPEAN SUPPLIERS OF MANUFACTURED CRFs (Concluded)

Company/Country	Urea Reaction Products: UF	Urea Reaction Products: IBDU	Coated Fertilizers (PCFs)
Sadepan			
Belgium	X		
Italy	X		
Scotts			
Netherlands			X
UK	X		

[a] BASF manufactures IBDU and IBDU-based products exclusively for Compo.

CRFs (Continued) — SUPPLIERS

LEADING JAPANESE SUPPLIERS OF MANUFACTURED CRFs

	Urea Reaction Products			Coated Fertilizers	
Manufacturer	UF	IBDU	CDU	SCFs	PCFs
Chisso-Asahi Fertilizer			X		X
Mitsubishi Chemical		X			X
Mitsui Toatsu Fertilizer	X			X	
Nissan-Agri				X	X
Sumitomo Chemical	X				X
Taki Chemical					X
Ube Agri-Materials					X

CRFs (Continued) — SUPPLIERS

LEADING SUPPLIERS OF MANUFACTURED CRFs IN OTHER REGIONS

		Coated Fertilizers	
Company/Country	Urea Reaction Products (UF)	SCFs	PCFs
Ecolab			
Czech Republic	X		
Haifa Chemicals			
Israel	x		X
Hanfeng Evergreen			
China	X	X	X
Kingenta			
China		X	X

CRFs (Continued) SUPPLY/DEMAND

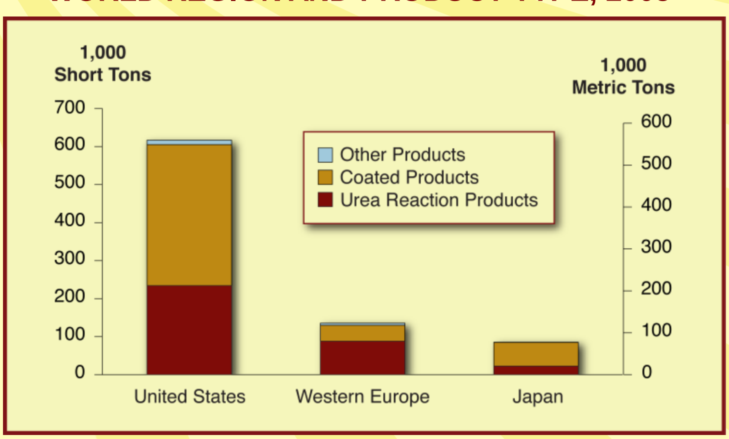
SUPPLY/DEMAND FOR MANUFACTURED CRFs BY MAJOR WORLD REGION, 2005 (1,000 Metric Tons)

	United States	Western Europe	Japan
Production	509	93	89
Imports	91	42	3
Exports	10	8	16
Apparent Consumption	590	127	76

Source: AgIndustries estimates.

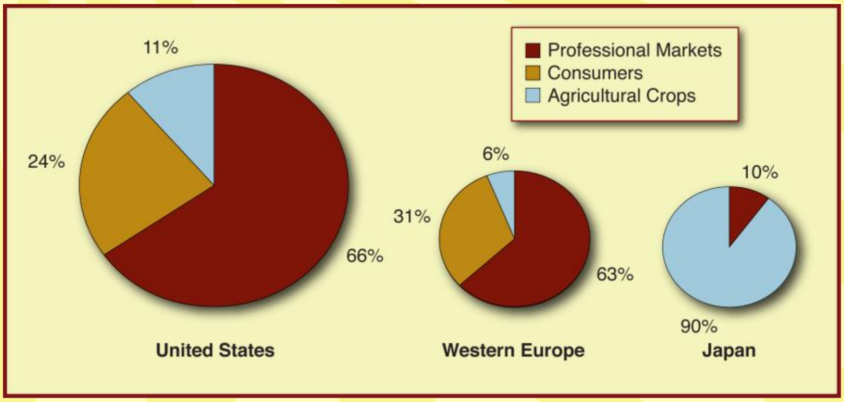
CRFs (Continued) CONSUMPTION

CONSUMPTION OF MANUFACTURED CRFs BY WORLD REGION AND PRODUCT TYPE, 2005



CRFs (Continued) — CONSUMPTION

MANUFACTURED CRFs MARKET DISTRIBUTION BY WORLD REGION



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CRFs (Continued) — CONSUMPTION

CONSUMPTION OF MANUFACTURED CRFs BY MARKET AND WORLD REGION, 2005 (1,000 Metric Tons)

	United States	Western Europe	Japan
Agricultural Crops	60	8	69
Consumers	132	38	NEG
Professional Markets[a]	368	77	8
Total	560	123	77

[a] Golf courses and other professional turf, professional lawn care and landscape maintenance, professional horticulture, and landscapers.

Source: AgIndustries estimates.

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CRFs (Continued)

U.S. MARKET TRENDS

SUPPLY

U.S. production of manufactured CRFs increased at an average annual rate of about 2% during 2001-2009.

- Production of urea reaction products, mainly UF products, declined at an average annual rate of less than 1%.
- Coated fertilizer production grew at an average rate of nearly 4.5% per year.

Imports accounted for 32% of the total U.S. CRFs supply in 2009.

- CRF imports, particularly PCF imports, increased very rapidly during 2001-2009.
- Since 2005, PCU products from Canada have accounted for the majority of U.S. PCF imports, and in 2009, represented nearly 96%.

CRFs (Continued)

U.S. MARKET TRENDS

U.S. PRODUCTION OF MANUFACTURED CRFs, 2001-2009p (1,000 Metric Tons)

Product Type	2001	2005	2009p
Urea Reaction Products	233	214	218
Coated Fertilizers, Total	206	281	292
Sulfur-Coated	152	194	198
Polymer-Coated	54	87	94
Other Products	11	14	14
Total, All Products[a]	450	509	524

p = preliminary.
[a] Data may not add to totals because of rounding.
Source: AgIndustries estimates.

CRFs (Continued) — U.S. MARKET TRENDS

U.S. IMPORTS OF MANUFACTURED CRFs, 2001-2009p
(1,000 Metric Tons)

Product Type	2001	2005	2009p
Urea Reaction Products	<1	7	3
Coated Fertilizers, Total	46	85	244
Sulfur-Coated	30	30	30
Polymer-Coated	16	55	214
Other Products	NEG	NEG	NEG
Total, All Products[a]	47	91	247

p = preliminary; NEG = negligible.
[a] Data may not add to totals because of rounding.
Source: AgIndustries estimates.

CRFs (Continued) — U.S. MARKET TRENDS

CONSUMPTION

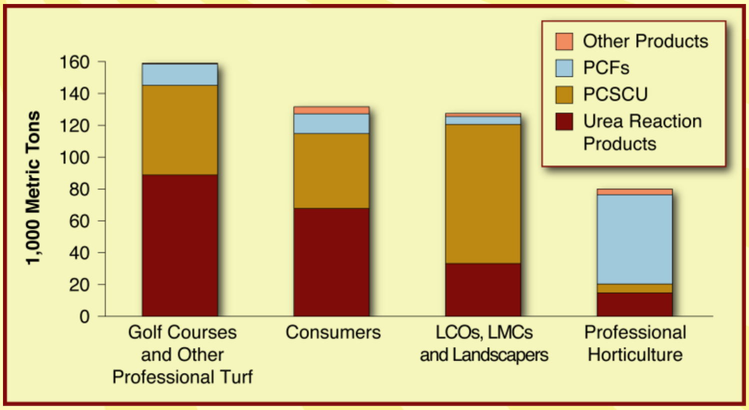
U.S. consumption of manufactured CRFs grew at an average annual rate of 4% during the 2001-2009 period.

- Consumption in nonfarm markets grew at less than 2% per year while consumption for agricultural crops increased rapidly at an average annual rate of 21%.
- Consumption of urea reaction products grew very slowly—at less than 0.5% per year.
- Consumption of coated fertilizers grew at an average annual rate of 6.2%.
  - Consumption of sulfur-coated fertilizers (primarily PCSCU) grew at an average rate of 2.7%.
  - PCFs consumption grew at nearly 14% per year, on average.

CRFs (Continued)

U.S. MARKET TRENDS

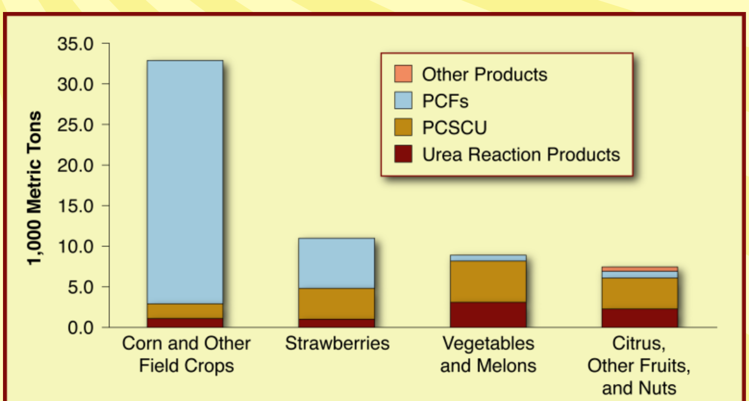
U.S. NONFARM MARKETS FOR MANUFACTURED CRFs, 2005



CRFs (Continued)

U.S. MARKET TRENDS

U.S. AGRICULTURAL CROP MARKETS FOR MANUFACTURED CRFs, 2005



CRFs (Continued) U.S. MARKET TRENDS

U.S. CONSUMPTION OF MANUFACTURED CRFs BY PRODUCT TYPE, 2001-2009p (1,000 Metric Tons)

Product Type	2001	2005	2009p
Urea Reaction Products	212	213	214
Coated Fertilizers, Total	247	337	413
Sulfur-Coated	179	211	220
Polymer-Coated	68	125	192
Other Products	9	11	11
Total, All Products[a]	468	560	638

p = preliminary.
[a] Data may not add to totals because of rounding.
Source: AgIndustries estimates.

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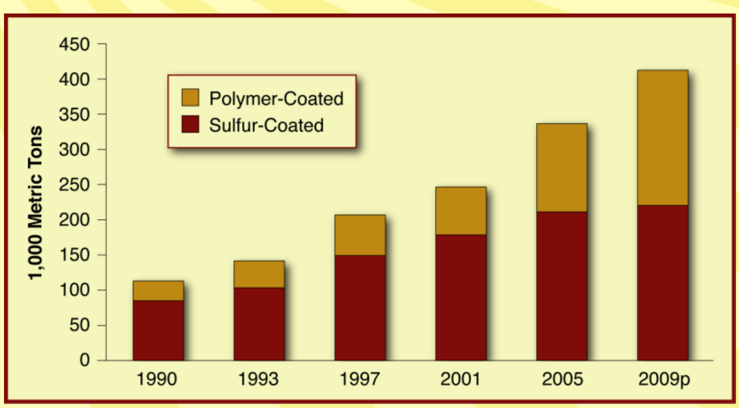
CRFs (Continued) U.S. MARKET TRENDS

U.S. CONSUMPTION OF COATED FERTILIZERS



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CRFs (Continued)

U.S. MARKET TRENDS

RECENT CHANGES

Significant changes in the overall structure of the North American CRFs industry and product supply since 2005 include:

- Agrium Inc.'s acquisition the Nu-Gro fertilizer technology and Canadian specialty products businesses from Spectrum Brands in January 2006.
- Agrium's completion of an expansion of its ESN® PCU facility in Carseland, Alberta, Canada in February 2006, bringing the total production capacity to 150,000 metric tons.
- Agrium's expansion of it Duration CR® PCU production capacity at Carseland to 40,000 metric tons in early 2006.
- Agrium's acquisition of Pursell Technologies, a leading U.S. producer of PCSCU and PCFs in August 2006.

CRFs (Continued)

U.S. MARKET TRENDS

RECENT CHANGES (Continued)

- Georgia-Pacific's launch of its second Nitamin® SRN liquid fertilizer (Nitamin Nfusion™), targeted for row crops, fruits and vegetables in late November 2006.
- The late 2007 start up of U.S. production of Plantacote® PC-NPK products in Summerville, SC by X-Calibur Plant Health Company under a long-term license from Aglukon of Germany.
- Start up of production and launch in the golf course market of a new line of UF-based homogeneous granular fertilizers (Platinum™) by Knox Fertilizer (Knox, IN) in spring 2007.
- Knox Fertilizer's launch of a new PCU product (SurfCote™, XRT™) in spring 2008.

CRFs (Continued) U.S. MARKET TRENDS

RECENT CHANGES (Continued)

- Agrium Advanced Technologies' cessation of production of IBDU at its IB Nitrogen facility near Mobile, AL in 2008.
- Agrium Advanced Technologies' initiation in March 2009 of an expansion of its Sylacauga, AL PCU production facility to provide it with capacity to produce 20,000 tons per year of ESN®. Completion of the project is expected in late 2010.
- Agrium Advanced Technologies announcement in May 2009 that it will build a new ESN® production facility in New Madrid, MO. The new facility, expected to be operational in 2010, will have an initial annual capacity of 110,000 metric tons.

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CRFs (Continued) U.S. MARKET TRENDS

RECENT CHANGES (Concluded)

- Agrium Advanced Technologies' opening of a new addition to its Courtright, Ontario, Canada fertilizer production facility in October 2009. The expanded facility will manufacture two CRF products: XCU™, the company's new PCSCU product, and Polyon® PCU. Its combined annual production capacity is 60,000 short tons.
- Agrium Advanced Technologies' announcement in October 2009 that it will make capital investments to its Sylacauga, AL manufacturing site to allow for an expansion of its Duration CR® PCF product line. New products will include small-sized PCU and PCK products for golf courses and PC-NPK products for professional horticulture.
- Steadily increasing supply (except in 2009) and marketing of solid UF fertilizers imported from Sadepan Chimica of Italy.

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SNFs

SNFs (Continued) SUPPLIERS

WORLD SUPPLIERS OF N STABILIZERS AND SNFs

Region/ Country/ Supplier	N Stabilizers	SNFs
UNITED STATES		
Agrotain International	X	X
Dow AgroSciences	X	
Nutra-Flo	X	X
Specialty Fertilizer Products (SFP)	X	
Tessenderlo Kerley	X	

SNFs

SUPPLIERS

WORLD SUPPLIERS OF N STABILIZERS AND SNFs (Continued)

Region/ Country/ Supplier	N Stabilizers	SNFs
WESTERN EUROPE		
Belgium		
BASF[a]	X	X
Germany		
BASF[a]	X	X
Compo		X
SKW Piesteritz	X	X

[a] Compo markets SNF products containing BASF's nitrification inhibitor.

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SNFs (Continued)

SUPPLIERS

WORLD SUPPLIERS OF N STABILIZERS AND SNFs (Continued)

Region/ Country/ Supplier	N Stabilizers	SNFs
JAPAN		
Chisso-Asahi Fertilizer		X
Nippon Carbide Industries	X	
Other Companies	X	
OTHER REGIONS		
China		
Hanfeng Evergreen	X	

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SNFs (Continued) — MARKET TRENDS

UNITED STATES

Recently introduced N stabilizers and other products designed to improve nitrogen fertilizer use efficiency include:

- NutriSphere-N™, an "N fertilizer enhancer" from Specialty Fertilizer Products (SFP), launched in June 2007.
- Instinct™, a new encapsulated nitrapyrin formulation from DowAgroSciences, registered for use with liquid N fertilizers and liquid manure for corn in August 2009.
- NutriLife, a proprietary biologically-based "fertilizer catalyst". In February 2009, Lebanon Turf was licensed to produce fertilizer products containing NutriLife and distribute them in the U.S. Northeast and Midwest.

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SNFs (Continued) — MARKET TRENDS

UNITED STATES (Continued)

Significant events and SNF market trends since 2005 include:

- Agrotain International's opening of a new Stabilized Nitrogen Center with capacity to produce 125,000 short tons of fertilizer per year in fall 2008.
- Continuing growth in use of N stabilizers and SNFs for corn and other field crops.
- Increasing acceptance of SNFs in the U.S. professional turf and professional lawn care markets.

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SNFs (Continued) MARKET TRENDS

WESTERN EUROPE

- Compo's Entec® line of SNF products, which contain BASF's nitrification inhibitor DMPP, have been well accepted in agricultural crop and professional turf markets in Western Europe.
- Agrotain International's Agrotain® nitrogen stabilizer technology received final registration for use in all 27 member states of the European Union (EU 27) in late November 2008.
- The Agrotain technology will be available in select countries of the EU-27 in Amiplus™ fertilizers produced by Yara International. The Amiplus™ line is targeted to growers of maize, wheat, rice, pasture, and other agricultural crops.

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SNFs (Continued) MARKET TRENDS

JAPAN

- Japanese companies have developed a number of nitrification inhibitor compounds, most of which were registered for use in the 1960s.
- DCD (or Dd in Japan) is by far the most widely used product because of its low cost compared to other nitrification inhibitors.
- Nitrification inhibitor-stabilized fertilizers are widely used in Japan, primarily for rice.
- Because it is difficult, time-consuming, and costly to develop new nitrification inhibitors that meet all the criteria for commercial success, no new products have been commercialized in recent years.

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Summary

- The U.S. agricultural crops market for CRFs has expanded rapidly since 2001, primarily as the result of increasing availability, demonstration of the benefits, and aggressive marketing of a new more affordable PCU product for corn and other large-acreage field crops.
- Availability and acceptance of SNFs are increasing in the United States and Western European agricultural crops sectors.

CONCLUSIONS

- World agricultural crop markets for EEFs—both CRFs and SNFs—are poised for very strong growth over the next five years.
- U.S. and total world consumption of coated fertilizers will continue to grow at a significantly faster rate than consumption of urea reaction products.

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