Fertilizer Trends - Growth in Drip/Water Soluble

Mark D. Roeder
Sales Manager - North America
Born and raised on a Corn and Soybean farm in Illinois
Agronomy degree
Grain elevator manager/trader (Co-op)
Ag Retail Sales (Independent)
Ag Retail Management (Independent-Major)
Ag Retail Area Management
  Bought and sold fertilizer (poorly at times 08-09)

ICL North American Sales Manager Specialty Fertilizers (Global)
Long Term Fundamentals

- Average growth rate over past 25 years = 42 mmt/year (1.653B bu corn)
- 5 year average growth = 68 mmt/year (2.677 B bu corn)
- Record demand growth in 2013/14: = 129 mmt/year (5.078 B bu corn)

Grain & Oilseed World Consumption

* Source: USDA Foreign Agricultural Service PSD
Consecutive Years of Record Global Crop Yields

- Pressure on crop prices driven by record global yields
- Crop yields and in turn global supply/demand balances often swing from year-to-year

* Source: USDA
Historical Nutrient Demand

- Growth in nutrient demand is critical in order to meet global food consumption
- P and K demand growth are below historical trend over the past 4-5 years
- 2007-2013 demand trend is unsustainable (too slow)

**Demand Growth Rate:**
- 2000-07: 3.0%
- 2007-12: 1.5%
- 2012-18f: 2.5%

**Nitrogen**

**Phosphate**

**Potash**

Represents Fertilizer Year Data
Source: IFA, Agrium
Barriers to growth in the world?

Logistics?
Knowledge?
• Balanced and adequate nutrient applications are important for crop yields

Nutrient Applications vs. Yield in Corn

There is approx. 89.2 lbs/a in 100 Kg/ha
There are approx. 16 bu/a in 1 tonnes/ha

Source: USDA, IFA, Agrium
Agribusiness Evolution: Production and Area Grains* (1/2)

Most part of the **Brazilian** success can be explained by the relevant growth in grain production, which occurred both through better yields performance and area expansion.

* Include: Soybean, Corn, Wheat, Rice, Peanut 1ª harvest; Peanut 2ª harvest; Oatmeal; Cotton; Barley; Castor Beans; Rye; Sorghum; Sunflower; Triticale; Bean 1ª harvest; Bean 2ª harvest; Bean 3ª harvest. Source: Conab. Elaboration: Agroconsult
Agribusiness Evolution: Production and Area

Sugarcane

Sugarcane has also benefited from productivity gains, as total production grew at a higher rate than the planted area.

Sugarcane: Evolution in Planted Area, Total Production and Yields

Yield 2000: 49.6 t/ha (21.2 T/a)

258  293  321  359  385  387  426  494  571  605  624  560  589  654  635

Production: +6.7%
Area: +5.1%
Yield: +1.5%
Agribusiness Evolution: Production and Area
Coffee

For coffee, productivity gains were even more essential for production increase, which occurred even with a drop in cultivated area.

Coffee: Evolution in Planted Area, Total Production and Yields

Yield 2000: 0,8 t/ha

Production: +3.1%
Area: +0.0%
Yield: +3.1%

Yield 2014: 1,3 t/ha

100.0%

Source: Conab. Elaboration: Agroconsult
AGRICULTURE MARKET UPDATE

Corn Prices are Highly Sensitive to Yield Changes

- U.S. corn supply/demand balance has tightened through the year in the past 2 crop years

Corn Ending Stocks and Stocks/Use

Decline in Ending Stocks From Projections @ Harvest

$3.55/bu

$5.18/bu

$6.22/bu

$6.89/bu

$4.46/bu

$3.68/bu

Current USDA

* Source: USDA, FactSet, Agrium
Long 2015 Fall Season to Support Nutrient Use

- NPK fall applications in Q4 will be supported by a season that started significantly earlier than last year and assuming a more normal close to the season, compared to the early close in 2014

*The proxy fall season length is the number of days between U.S. corn harvest reaching 75% complete and U.S. continental snowfall coverage reaching 50%. For 2015, the long-term average date of continental snowfall reaching 50% was used.

Source: NOAA, USDA, Agrium
David Coppess, executive vice president, sales and marketing, for Heartland Co-op; growers have no confidence in fertilizer prices going forward and want to end the fall application season with empty bins. Coppess also reported a lot of interest in specialty fertilizer products at the retail level as growers seek to optimize nutrient uptake and reduce reliance on traditional fertilizers.

there will be a shift to more spring-applied urea and UAN over anhydrous ammonia, particularly as growers face increasing regulatory and environmental pressures.

Weather was not the only difference a year makes, as most commodity fertilizer prices were lower in November 2015 versus November 2014 (see pp. 4-5), though specialty fertilizers appeared to be holding their own.
Fertilizer Usage: Farmers’ Expectation

According to ICAgro survey, farmers were willing to maintain fertilizer dosage for the 2015/16 Crop Season.

Fertilizer Dosage for the Next Season (2Q 2015 Results) - %

- No answer: 5%
- Lower: 13%
- Same: 78%

Are you going to decrease Fertilizer Dosage for the Next Season? (Previous Results) - %

- 1Q 2015: 13%
- 4Q 2014: 9%
- 3Q 2014: 7%

Source: ICAgro FIESP/OCB.
Most of the increased global capacity is expected in 2016 and 2017.
Chinese capacity expansions are projected to slow after 2016.

Source: CRU, Fertecon, IFA, Agrium
Industry consolidation is accelerating changing product markets

US nitrogen demand:
- Ammonia: 27%
- Urea: 21%
- NPK: 7%
- DAP/MAP: 7%
- Nitrates: 6%
- UAN: 27%
- Other: 2%

European nitrogen demand:
- Urea: 22%
- NPK: 12%
- DAP/MAP: 11%
- Other: 10%
- Nitrates: 43%

Where needs take us
Global UAN Capacity Additions

Global UAN Capacity Additions (mmt Product)

Source: CRU, Fertecon, IFA, Agrium
Global urea cost floor has been driven by the cost of anthracite-coal based production in China.

Other costs include other cash production costs, and freight to port and export taxes where applicable. Ocean freight is excluded.

Source: Ferteco, CRU, Agrium
U.S. Nitrogen Offshore Imports

- U.S. offshore imports accounted for over **50%** of U.S. nitrogen consumption in 2014
- Probable U.S. nitrogen projects lower the import proportion to ~**25%**
- Another ~$15B of investment required to meet the remaining import gap
- ~27% of U.S. nitrogen production located in the US Gulf, helps sustain premiums in interior major growing regions

### Source
U.S. Dept. of Commerce, Zepol, Integer, Agrium

*Includes Agrium Borger, CF Donaldsonville, CF Port Neal, Dyno, Yara/BASF, OCI, Koch, Dakota Gas, Simplot and some other minor projects
Considering 3 greenfield projects and 6 brownfield or expansion projects
Global Nitrogen Capacity Utilization

- Higher capacity additions than demand growth drive lower capacity utilization in 2016, but by 2018 demand growth exceeds supply growth
- **Chinese capacity utilization was higher than global average in 2014/2015**, but expected to decline to global equivalent levels in 2016-forward
- Urea capacity utilization dips lower than overall N due to urea upgrade projects

Source: CRU, Fertecon, IFA, Agrium
Global Potash Capacity & Demand Growth

Cumulative Global Capacity Additions & Demand Growth (mmt KCl)

- Demand Growth
- Operational Capacity

Source: Fertecon, Agrium, (Total KCl global capacity of ~74 mmt at 100% of capacity in 2015, 67 mmt of operational capability in 2015.)
The supply/demand outlook has improved since last year
- Stronger than expected 2014 and 2015 demand and improved demand outlook
- Flooding of Uralkali mine reduced supply
- Capacity utilization now projected to bottom out in 2018/2019 at similar levels to 2013

Source: Fertecon, Agrium
Global Phosphate Capacity & Demand Growth

- Ma’aden project in Saudi Arabia has experienced delays in the past year
- China has balanced the market over the past year, but some expect capacity in China to decline over the medium term
- Indian demand has been robust in 2015, but weakened rupee is a risk

Source: CRU, Agrium
World Phosphoric Acid Supply and Demand

Expect Relatively Balanced Supply/Demand in the Medium Term

*Estimated annual achievable production level from existing operations and projected new capacity.
World Phosphoric Acid Capacity Additions

Majority of Expected Capacity Developed in Morocco, Saudi Arabia and South America

Source: CRU, IFA, PotashCorp
Phosphoric Acid Production

Excludes China

Plant problems/closures are balancing market
• **Nitrogen**-is fairly in balance with projected growth and projected demand

• **Phosphates**-have transitions, but are coming in line with projected demand

• **Potash**-production will exceed demand after “fixes” and upgrades into 2019. Expected to improve after that.

With supply and demand in balance what will drive pricing? Where are there challenges/opportunities?
Field crops - different methods of irrigation

- Pivot sprinklers
- Rain fed
- Drip
- Flood furrow
Drip Irrigation Trends / Drivers

- Record drought
- Water restrictions, increased regulation
  - Drip is often exempt from restrictions
- The need for efficiency is driving the growth in drip irrigation
In Drip Irrigation, the plant foliage remains dry. This prevents the diseases and leaf burns that are sometimes evident in sprinkler Irrigation.

In Drip Irrigation, the area between wetted strips is kept dry. This facilitates the movement of machinery and farm implements when irrigation is in progress.

Drip Irrigation is well suited to all soils and also for heavy soils with low infiltration rate or soils that form surface crusts when sprinkled.

Drip Irrigation requires no special land preparation.
Figure 2-3 Change in Irrigation Methods in California (1977-2010)
North America revenue by product, 2012-2022

(USD)
Crops using Micro Irrigation

**Orchard Crops**
- Vegetables, fruits, berries, medicinal herbs, mushrooms, perennial vegetables, and nut-producing trees
- Primarily grown for commercial purposes in large areas

**Field Crops**
- Crops such as corn, hay, small grains, and soybeans
- Grown to feed animals

**Plantation Crops**
- Crops include arecanut, coconut, sugar cane, oil palm, cashew, coffee, cocoa, tea, and rubber
- Monoculture crops cultivated on an extensive scale over a large area

**Forage and Grasses**
- Grass and legume plants mainly grown for livestock feed
- Assist in land conservation and reclamation
- Fibrous in nature
PROJECT:
SDI

Departments of:
Agronomy and Biosystems & Agricultural Engineering
From This
To this!
"Our energy use was cut by half to two-thirds."

Bill
Grand Island, NE

Corn Growers Convert to Subsurface Drip Irrigation
Netafim USA

Published on Feb 13, 2014
Learn more here: http://bit.ly/1w4oVDR

Listen to growers who’ve converted from center pivot and furrow irrigation systems to a Netafim SDI system, discuss the benefits they’re now experiencing.

SHOW MORE
This is NOT just about water!

Typical Benefits of Micro-Irrigation

- Maximize Water Use Efficiency
- Reduce Energy Use
- Reduce Labor Costs
- Reduce Fertilizer Use
- Reduce Pesticide Use
- Improve the Environment
- Improve Flexibility
- Improve Crop Quality and Uniformity
- Increase Yields

Income and Quality

Water Energy Labor Fertilizer Pesticide
Commodity Crops (Corn, Alfalfa, Cotton) are still in the infancy of development.

- The cost of Sub-Surface Drip Systems and ROI are barriers to growth in these markets.
- Having said that…Cotton in West Texas is a well penetrated market.

“So what?”
Perfect marriage

- Ability to immediately respond to a crops water and nutrient needs is extremely valuable.

- Gives opportunity to match crop nutrient uptake curves.

- Helps avoid losses of water and nutrients beyond the root zone.
DRIP IRRIGATION BENEFITS BY GROWTH STAGE

VEGETATIVE STAGES

VE
Germination and Emergence
Rapid, uniform germination and emergence

V1-V5
Early Vegetative Stages
Precision application of nutrients promotes rapid root development.

V6-V14
Rapid Vegetative Growth
Optimizing water supply and nutrient availability to plants during peak N, P and K uptake period.

REPRODUCTIVE STAGES

VT
Critical Flowering Stage and Tasseling
Supply peak water needs during most yield critical period to maximize crop potential.

R1-R6
Grain Fill and Harvest
The ability to apply late season nutrient requirements directly to the root zone.
Projected growth of Drip (world)

Source - MarketsandMarkets Analysis

Market Share M$
Drip Irrigation Market US projected through 2020

MarketsandMarkets
North America Water Soluble Projected Growth

Million Dollars


Linear (Millions)

Millions

North America Water Soluble Projected Growth Million Dollars


Linear (Millions)

Millions

As the efficiencies of the technology improve...
**Volume by Nutrient Global**

2012:
- Nitrogen, 68.4%
- Phosphate, 12.9%
- Potassium, 15.1%
- Others, 3.6%

2019 P:
- Nitrogen, 67.7%
- Phosphate, 12.6%
- Potassium, 15.9%
- Others, 3.8%
Projected NA growth by nutrient

- Nitrogen
- Phosphate
- Potassium
- Others
Some of the Major Players?

Yara

PotashCorp

CF Industries

ICL

LOTS of Others

- EuroChem, UralChem OJSC, K+S AG, Haifa Chemicals, Aries Agro Ltd., Sinofert, SQM and Coromandel
Water Soluble Trends

Up significantly in the next several years US too!

25%-30% is used as a Foliar application

70%-75% is used in Fertigation

Nitrogen is most popular and will show substantial growth

Potassium is very attractive, and will grow at a little faster rate

Phosphate is the least attractive due to low solubility/acidity issues

Secondary and Micro nutrients will be big sellers

Water and soil conditioners will have opportunities as well
Critical Success Factors in Latin America

Relevant factors when buying fertilizer (Multiple Choice %)

- Credit availability
- Payment terms
- Service and delivery time
- Technical assistance
- Brand reputation
- Product Quality
- Price

- More Important
- Important
- Less Important

Valid sample base: 78 respondents