International Fertilizer Industry Association

Global Fertilizer Production and Use: Issues and Challenges

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3. Meeting food demand / Reducing environmental footprints

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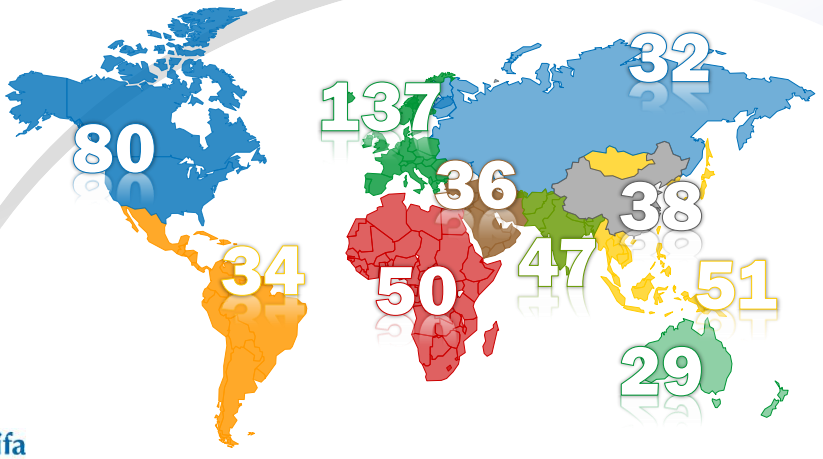
About IFA

Membership / Legitimacy and diversity

540 members **85** countries



IFA's purpose and activities

VISION

The fertilizer industry contributes to global food security through the **efficient and responsible production, distribution and use of plant nutrients on a world-wide basis**.

IFA'S MISSION

IFA promotes fertilizers through **four key activity streams**

- Statistics & Market Intelligence
- Business Networking
- International Engagement
- Benchmarking & Best Practices

APPROACH

IFA provides a **framework for collaboration** within the fertilizer value chain on areas of common interest, platforms to discuss the complex issues facing the sector and a structure for agreeing common positions and joint actions.

Benchmarking and Best Practices: Producty Safety

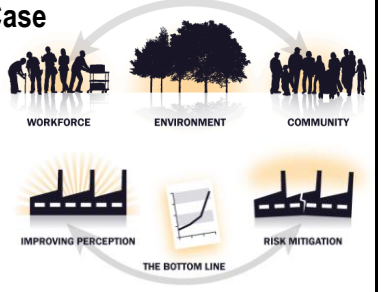
- → More efficient workplaces = increased productivity
- → Risk mitigation =
  - < few incidents
  - < less remedial expenses
- → Safe and secure workplace = improved business performance

12 SHE Principles

IFA developed 12 guiding principles for SHE (Safety, Health and Environmental) management.

protect&sustain
IFA'S PRODUCT STEWARDSHIP INITIATIVE

The Business Case



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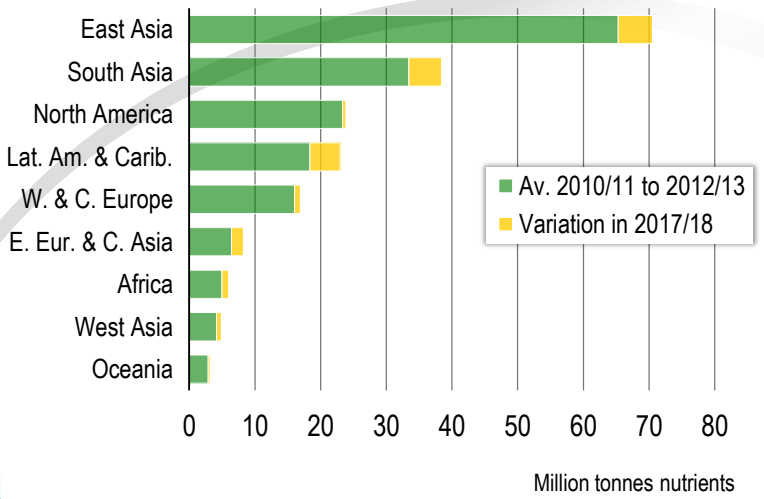
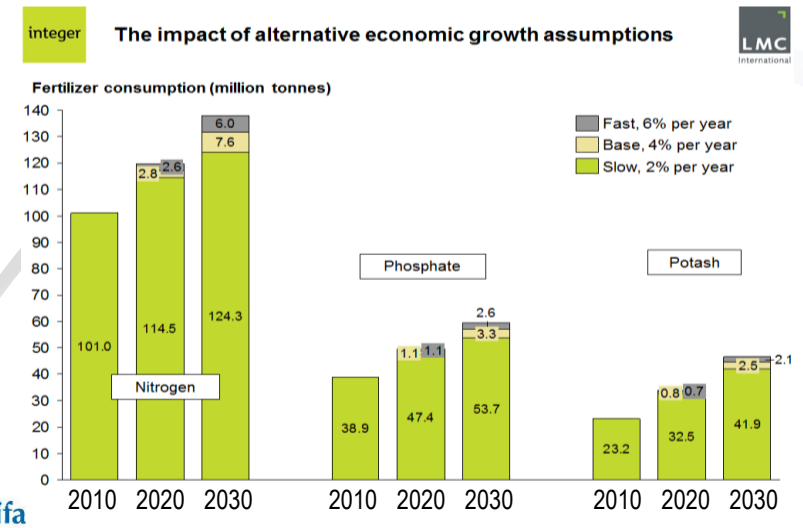
Overview of fertilizer demand and supply

Steady increase in world fertilizer demand 5-year outlook



| Source: IFA Agriculture

Steady increase in world fertilizer demand Outlook to 2030



Rising challenges in securing future fertilizer supply

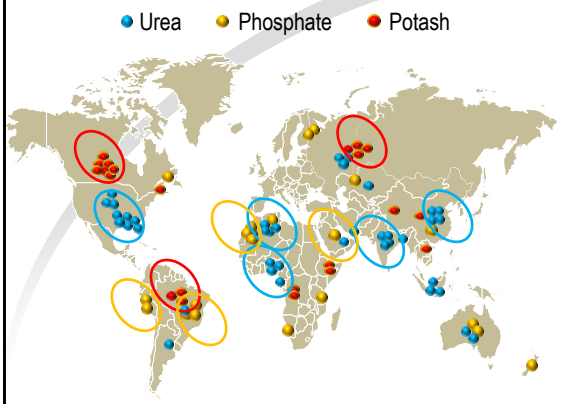
DRIVERS	FACTORS
Feedstock and access to natural resources	Natural gas supply: chronic shortfalls
	Shale gas developments
	Phosphate ore grade and quality
Economic Drivers	Capacity delays
	Financing challenges
Regulations	Environmental regulations and impact assessments
	Product safety
Policy	Export taxes
	Domestic investment policy

Heavy investments in new capacities



- Industry has responded to tight market conditions of 2007/08 and to prospects for sustained demand growth in the near term
- Projected new capacity between 2012 and 2017
  - 220 new fertilizer units
  - 20 P rock mining projects
  - Equivalent $150 billion investment

Dynamic regional distribution of fertilizer sources of supply



Nitrogen developments shifting to the USA and adding capacity in North Africa, China and Indonesia. Large potential projects in India and SSA (Nigeria, Ghana…).

Extensive **phosphate** capacity will emerge in Morocco, Saudi Arabia, Peru and Brazil.

Potash projects are concentrated in Canada and Russia, and to a lesser extent SSA (Ethiopia, Rep Congo, Namibia) and Laos.

In blue, export-oriented projects.

Meeting food demand / Reducing environmental footprints

Food security and meeting demand

- → Feed **2 billion more** people by 2050
- → Still **850 million** hungry
- → Increasing demand for livestock products
- → Competing demand for feedstock for biofuels / bioenergy

60% increase in total agricultural production (latest FAO projection)

Increase yields and cropping intensity: **90%** of the anticipated gain

Greater (and more efficient) use of fertilizers (and other nutrient sources)

Industry responds through heavy investments in additional capacity

Preventing land use changes

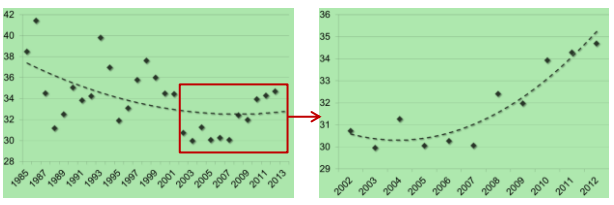
- ➔ World arable land area in 2009: 1,533 Mha
- ➔ Anticipated expansion by 2050: 70 Mha (+4.6%)
  +120 Mha in developing countries
  - 50 Mha in developed countries
- ➔ Conversion to arable land releases huge amounts of CO_2
  260 t CO_2-eq/ha for temperate forests
  590 t CO_2-eq/ha for tropical forests
- ➔ Increasing productivity is a must to:
  Mitigate GHG emissions from land use changes
  Preserve biodiversity-rich areas

Improving nutrient use efficiency

Imperative from agronomic, economic and environmental perspectives

NITROGEN

- ~40% recovery under farm conditions in year of application (global average)
- 60-80% in research plots room for improvement
- NUE improving for 3 decades in developed countries
- NUE stagnating or declining in developing countries
- Recent change in China



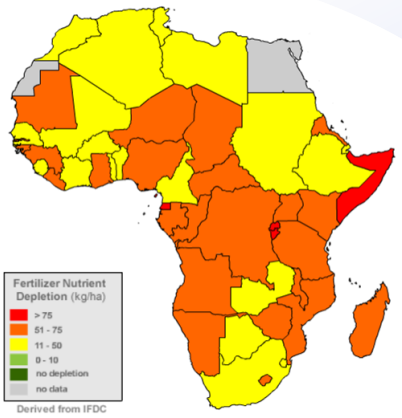
PHOSPHATE

- Losses mostly through erosion (slopping land, concentrated livestock farming)
- Low PUE in year of application, but can reach up to 90% using the balance method over at least a decade

Urgent need to restore soil fertility

- Average fertilizer application rate ~9 kg nutrients/ha / *Mostly on cash crops*
- Not sufficient to offset nutrients removed → massive soil mining
- More than 40% of the 220 Mha of farmland lose > 30 kg nutrients/ha/year
- Losses worth US$ 4 billion annually
  → Urgent need to replenish African soils' nutrient pools
  → Need innovative approaches to improve nutrient supply and use in the region

Soil Nutrient Depletion in 2004



Fertilizing Crops to Improve Human Health

New paradigm

- Not only improve soil fertility, yield and profitability; but reduce environmental impact,
- … also enhance human health
- From food security (enough calories) to nutrition security (all essential nutrients)

Success stories

- Zinc in Turkey
- Selenium in Finland and New Zealand

➢ Need to scale up

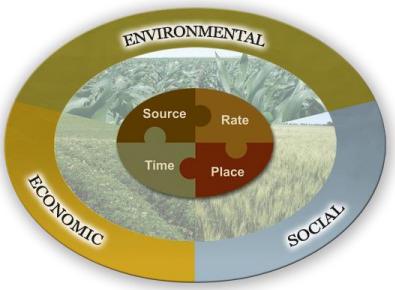
Fertilizer can also influence composition of food products

- N, S → proteins
- K → lycopene, isoflavone

Nutrient stewardship programs

- Inappropriate fertilizer practices are widespread:
  - → Blanket recommendations; Unbalanced fertilization
  - → Single basal application; No soil testing/plant analysis
- Often responsible for large yield gaps and poor fertilizer use efficiency
- Best management practices improve productivity, profitability, preserve the environment → meet the economic, social and environmental goals

- **Nutrient Stewardship** actively promoted by the fertilizer industry: Apply the **right source,** at the **right rate**, at the **right time**, in the **right place**



Knowledge transfer

- Developing countries account for 2/3 of world consumption
- Inefficient 'conventional' governmental extension
- Hundreds of million smallholder farmers are not satisfactorily advised on fertilizer management → poor use efficiency

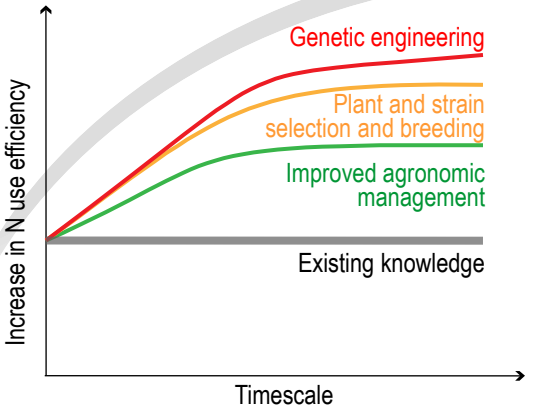
- **Develop solutions to supplement extension workers**
  - → Develop common knowledge platform to ensure consistent messages
  - → Train agri-input dealers to provide agronomic advice
  - → Use mobile phone technology for customized, real-time, crop- and site-specific recommendations

Special products

Slow- and controlled release fertilizers	Stabilized fertilizers
Fertilizers supplemented with micronutrients	Soluble / liquid fertilizers (fertigation, foliar sprays)

- → Mostly used on specialty crops
- → Constrained by price differential
- → New products could alleviate the price constraint
- → Virtual Fertilizer Research Center (launched in 2010 by IFDC): Creating the next generation of fertilizers

Biotech vs agronomy



- In the short and medium term, most of the gain in nitrogen use efficiency is expected to come from improved agronomic practices
- Biotechnology is seen contributing only in the long term, and relatively modestly (less than 'conventional' breeding)

Source: Giller *et al.*, 2004

Summary and conclusion

IFA is delighted to co-host this meeting with our Chinese partners

China can play a key role in a global action and advocacy campaign on nutrient management

IFA looks forward to the outcome of these discussions and are ready to join hands with all of you in improving the global image of our industry

For questions / comments

chebebrand @fertilizer.org

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