

Growth of Biostimulants
Prompts Need for IPR

ABIM Preview

India's Crop Protection
Market Has Room to Grow

ADVANCING THE GLOBAL CROP PROTECTION AND PLANT HEALTH INDUSTRIES

AgriBusinessTM GLOBAL



THE INDIA REPORT

**Top Indian crop protection companies
share their perspectives on change.**

Story begins on p. 8.

The formula of valuable solution for agriculture

HERBICIDE

Flumioxazin
Isoxaflutole
Mesotrione
Butoxydim

Imazethapyr
Imazamox
Imazapic
Imazapyr

2,4-D
2,4-DB
2,4-DP-p
Dicamba

MCPA
MCPB
MCP-p
Clopyralid

Clethodim
Metribuzin
Fomesafen
Oxyfluorfen

Acethlor
Metazachlor
Metolachlor
S-Metolachlor

Penoxsulam
Diclosulam
Cloransulam
Flumetsulam
Florasulam

Sulfentrazone
Carfentrazone
Amicarbazone
Flucarbazone
Mesosulfuron

Glyphosate
Glufosinate
Bentazone
Clomazone
Fluroxypyr

Picloram
Diuron
Triclopyr
Bromacil
Hexazinone

Atrazine
Ametryn
Bispyribac
Propanil
Flufenacet

Cyhalofop
Clodinafop
Fenoxaprop
Quizalofop
Haloxypop

INSECTICIDES

Thiamethoxam
Clothianidin
Dinotefuran
Chlorfenapyr

Methoxyfenozide
Indoxacarb
Pymetrozine
Bifenthrin

Lufenuron
Profenofos
Acephate
Chlorpyrifos

Imidacloprid
Acetamiprid
Ethiprole
Fipronil

Diafenthiuron
Pyriproxyfen
Methomyl
Oxamyl

Abamectin
Emamectin
Bifenazate
Lambda-cyhalothrin

FUNGICIDES

Azoxystrobin
Pyraclostrobin
Trifloxystrobin
Picoxystrobin

Prothioconazole
Cyproconazole
Difenconazole
Epoconazole

Fluazinam
Boscalid
Fludioxonil
Cyprodinil

Tebuconazole
Propiconazole
Isoprothiolane
Dimethomorph

Benomyl
Carbendazim
Pyrimethanil
Spiroxamine

Captan
Chlorothalonil
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PRODUCT RANGE

Insecticides

Product Name
Alpha Cypermethrin Technical
Cypermethrin Technical
Deltamethrin Technical
Permethrin Technical
Chlorpyrifos Technical
Indoxacarb Technical
Fipronil Technical
Diiflubenzuron Technical
Quinalphos Technical
Profenophos Technical
Triazophos Technical
Temephos Technical

Herbicides

Product Name
Anilofos Technical
Isoproturon Technical
Dicamba Technical
Triclopyr Butoxy Ethyl Ester
Bispyribac Sodium Technical

Public Health Products (WHO approved)

Product Name
Alpha Cyper Technical
Deltamethrin Technical 98.5%
Temephos Technical
Chlorpyrifos Technical

Vet Products

Product Name
Oxyclozanide
Deltamethrin Technical
Cypermethrin Technical
Permethrin Technical
Fipronil Technical

Plant Growth Regulator

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Intermediates

Product Name
Cypermethric Acid (98:2)
Cypermethric Acid Chloride (40:60)
High Trans CMA (2:98)
High Trans CMAC (2:98)
Meta Phenoxy Benzaldehyde
Meta Phenoxy Benzyl Alcohol
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Dicamba Drift-Related Investigations, Injured Soybean Acreage

Soar in the U.S.

BY DR. KEVIN BRADLEY

ASSOCIATE PROFESSOR, DIVISION OF PLANT SCIENCES
UNIVERSITY OF MISSOURI

On a national scale, there are now more than 2,200 dicamba-related injury investigations being conducted by various state Departments of Agriculture, and more than 3.1 million acres of soybean estimated with dicamba injury. In my opinion, we have *never* seen anything like this before; this is not like the introduction of Roundup Ready or any other new trait or technology in our agricultural history.

In reality, we will likely not know the extent of dicamba damage until the end of the season, but Figures 1 and 2 provide some updated numbers as of Aug. 10. In comparison to the previous reports from just a few weeks ago, the number of cases under investigation in many states in the Midwest has at least doubled, and the soybean acreage estimated with dicamba injury has increased dramatically in many of these same locations.

My recommendation:

We are in the process of trying to understand how or if these cases can be correlated back to any particular environmental condition such as air or soil temperature, moisture, humidity, etc. That process isn't easy and it can't be done quickly, and any conclusions we can make will only be as good as the data we can get. I'm not sure what that process will yield, but from where I sit right now the only conclusions I can make are that the areas in Missouri that planted the most of the Xtend trait and sprayed the most Engenia, XtendiMax, or Fexapan are the areas where we saw the greatest amount of off-target movement and damage.

I know farmers are looking for answers and will soon be making decisions about their traits and weed management programs for next year. So my recommendation for those growers who wish to plant the Xtend technology is to go back to using dicamba at a timeframe and in a manner when it has been used "successfully" in the past. Based on our history of dicamba use in corn in April and May, and even on our experiences this year using these approved dicamba products in pre-plant burndown applications prior to June, we have seen far fewer problems with off-target movement of dicamba in that timeframe than what we experienced in June, July, and August. Even this season I was not notified of any problems with off-target movement of dicamba until early June, and the Missouri Department of Agriculture didn't receive their first dicamba complaint until June 13. It seems that almost all of the problems with off-target movement occurred once in-crop, post-emergence applications started to be made for waterhemp and Palmer amaranth. Most of those occurred in June and July this season. I wish I had

some definite date for a cutoff but at this time I do not; we will be conducting more weather analyses in the coming weeks and hopefully this process will help us understand which factors lead to more risk when applying these herbicides.

So for the sake of neighboring non-Xtend soybean fields, trees, vegetable crops, gardens, ornamentals, and our industry as a whole, my recommendation for those who want to plant the Xtend trait in 2018 is to use the approved dicamba products for the control of resistant horseweed (a.k.a. marestail), ragweed species and winter annuals in the pre-plant burndown where these products have a great fit, but to abstain from applying these products later in the season. In Xtend soybean, resistant waterhemp will have to be managed using an integrated approach that includes cultural practices like cover crops, narrow row spacings, etc. along with an overlapping residual herbicide program.

Figure 1.

Official dicamba-related injury investigations as reported by state departments of agriculture (as of Aug. 10, 2017).

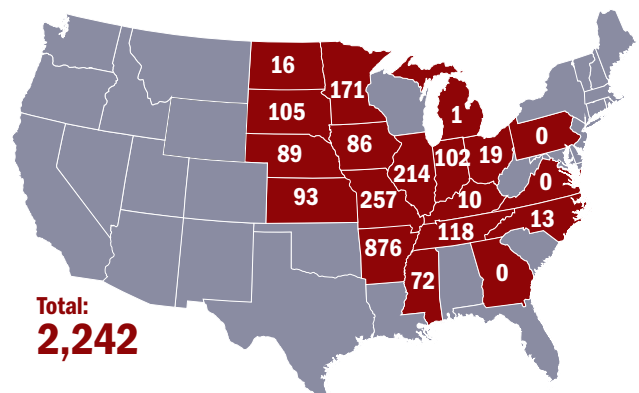
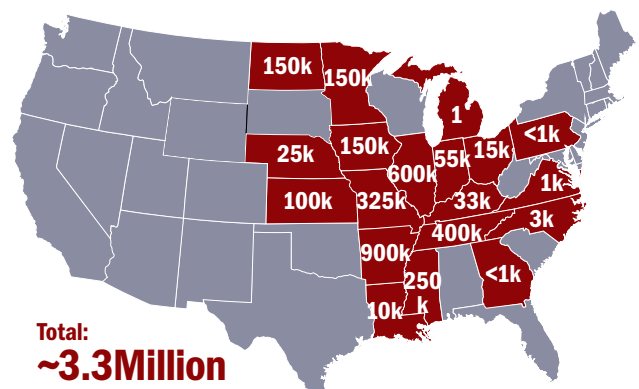


Figure 2.

Estimates of dicamba-injured soybean acreage as reported by state extension weed scientists (as of Aug. 10, 2017).





EU Commission Opens In-Depth Probe into Monsanto, Bayer Merger

The European Union Commission said on Aug. 22 it has opened an in-depth investigation to assess the proposed acquisition of Monsanto by Bayer, citing concerns the merger may reduce competition in areas such as pesticides, seeds, and traits.

Commissioner Margrethe Vestager, in charge of competition policy, said:

“Seeds and pesticide products are essential for farmers and ultimately consumers. We need to ensure effective competition so that farmers can have access to innovative products, better quality and also purchase products at competitive prices. And at the same time maintain an environment where companies can innovate and invest in improved products.”

The Commission has 90 working days, until Jan. 8, 2018, to take a decision.

Given the worldwide scope of Bayer and Monsanto's activities, the Commission said it is cooperating closely with other competition authorities, notably with the U.S. Department of Justice and the antitrust authorities of Australia, Brazil, Canada, and South Africa.

Pearce Talks India, China at Trade Summit



Stephen Pearce, Director of AWP Associates Limited, sat down with *AgriBusiness Global* Senior Editor Jackie Pucci in Las Vegas, to discuss the impact of Make in India and the next round of environmental regulations in China. Pearce said: “The environmental (situation) is getting stricter and stricter in China. The Chinese government is absolutely determined to fix their (environmental footprint). That starts with inspections. They are banging on every single door. Agchem is not a special segment, but they're very serious about making sure things are properly made.”

Pearce added that enforcement and relocation of plants could “create a little flux, not just in terms of AI purchasing, but down in Tier 1, Tier 2, and even Tier 3 suppliers, where an organization might not be as backwardly integrated. It's what happens further back in the supply chain that can cause problems.”



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How 'Make in India' Will Impact the Crop Protection Industry

BY PRADEEP SHARMA &
DR. BOB FAIRCLOUGH
KLEFFMANN GROUP



"Make in India" is an initiative taken up by the new government in New Delhi to attract foreign business to the country. The objective of this initiative is to ensure that the contribution of the manufacturing sector, which is around 15% of the country's Gross Domestic Product (GDP), is increased to 25% in the next few years.

Before the Make in India campaign, the general problems investors in India faced were reflected in the World Bank report, "Ease of Doing Business," in which India is ranked only 142nd out of 189 countries. This was one reason why multinational agrichemical companies did not invest in India compared to other Asian countries.

But now India's government is promoting its ambitious initiative, aiming to transform the country from being Asia's third-largest economy into a global manufacturing powerhouse. The initiative has set an ambitious goal of creating 100 million additional jobs in the manufacturing sector by 2022.

Growth, Competitiveness, and Process Initiative milestones:

- The government has announced many measures to improve competitiveness in the sector.
- Share of manufacturing approved by the Cabinet as per the erstwhile Planning Commission would contribute 25% of the GDP by 2025.
- Approval is granted for Foreign Direct Investment (FDI) up to 100% in the chemicals sector, excise duty reduced from 14% to 10%, along with strong laws on anti-dumping to further promote

the industry.

- Cumulative FDI inflows into chemical industry reached \$10,588 million during April 2000-June 2015.
 - A dedicated focus toward innovation and research and development as the government is trying to support the chemical sector's movement up the value chain from bulk chemicals to more value-added chemicals. For this, there are special incentives offered for setting up Special Economic Zones (SEZs) and National Investment Manufacturing Zones (NIMZ) in designated areas of Jammu and Kashmir, North East Region, Himachal Pradesh, and Uttarakhand.
 - The government has also approved four Petroleum, Chemical and Petrochemical Investment Regions (PCPIRs) in the state of Andhra Pradesh (Vishakhapatnam), Gujarat (Dahej), Odisha (Paradeep) and Tamil Nadu (Cuddalore and Naghapattinam) to promote investment and industrial development in these sectors.
 - India is more open to the idea of genetically-modified organism crops, with the new government giving permission to test GM mustard.
 - With the new goods and services tax (GST) to be introduced, it will be a strong step in promoting the government's commitment toward improving the ease of doing business rating for India.
- India has the potential to become the second-biggest chemical market in Asia within the next 10 years, but only if the right conditions for the industry are created will investments in chemical plants happen in India.

Coromandel: Beyond Fertilizer to Solutions Provider

Coromandel's Roshan Mammen, Associate Vice President & Head Exports – Global, and S. Srikanthan, Chief Operating Officer of the Crop Protection Division, sat down with Senior Editor Jackie Pucci at the *AgriBusiness Global Trade Summit* in Las Vegas to discuss the Indian market and what's next for the company.

How do you set yourselves apart from other Indian manufacturers?

Mammen: Most of our visibility comes through fertilizer, but it's actually not the case. We are the only company that is a solutions provider in India. If you see our business, we do everything in India, except seeds. We have fertilizers, specialty nutrients, crop protection, technical services, and farm equipment. We have our own farm retailer business.

We are today the only Indian company that's been successful in retail services. We have around 450 of our own retail stores, owned and operated by the company. The stores' positioning is as a solution provider, so the farmer walks in for advice on products to services. He gets everything at that store. We are present more in the South of India, but we are slowly getting more in the West and will probably access other markets.

You will not see a fertilizer company into agrichemicals who is also doing well. We are growing well and are known in the market and the crop protection space also. At the end of the day, your client is the same. You're addressing the needs of the farmer. From that perspective, we have a little more rounded knowledge of how the farmer is evolving: how his fertilizer needs are evolving, how his crop protection needs are evolving. We get more



Roshan Mammen

rounded view on that because of our presence in those segments.

What are your expansion plans?

Mammen: We are slowly expanding our presence into more key countries. This year we opened two subsidiaries in Nigeria and in Mali. We are looking at two more in Africa and two additional locations in Asia-Pacific. In Latin America we have a direct presence in Mexico, Argentina, Brazil, and are looking at one more in the Andean region. We will have four subsidiaries in Africa apart from the two we already have and another three in Asia. So footprint-wise, we will be there. Then it's only providing the right products.

Accessing the channel directly is a debate that we keep having internally, but we still feel that if you're working with the right partner for marketing your product, you do what is best and they do what

Unique Strength in R&D, History Guide Gharda's Growth Path

N.P. Nair, Vice President of International Sales, shares his perspective on the company's vision and other issues impacting the market, including Make in India.

What do you want people to know about Gharda and how the company has evolved?

We have been in the chemical industry for more than 50 years and are one of the leading manufacturers of agrichemicals in India. We are one of the top companies in India that has its own R&D strength. Most Indian companies are dependent on the process from outside. Gharda is one company that has such a facility and spends more than 10% of profits on R&D. We were the first to introduce many agrichemicals in India — for example: synthetic pyrethroids, chlorpyrifos, fipronil, deltamethrin, and dicamba.

Our founder, Dr. (Keki) Gharda, is a great scientist who has been awarded by American Institute of Chemists, and has been recently been awarded posthumously by the government of India one of the highest civilian awards for contributions to society.

In the agrichemical field, we have decided to launch two off-patent agrichemical products every year. In 2018 we are coming with two molecules, but aren't disclosing which ones yet. The work is in a very advanced stage, and registration will be completed by early next year.

I feel it's a great company with Dr. Gharda's vision, and I also have found the company has high potential for growth and new molecules. Very shortly, you will find that Gharda is among the top one or two companies in India.

they know best — I think it's the right marriage. We still believe in that.

Can you discuss your biggest products and exports?

Mammen: Our most popular and largest product volume-wise is mancozeb, which came to us with the acquisition of Sabero in 2011. Post that, we've done more registrations, expanded the plant, and set up a new plant. Capacity today is around 45,000 tonnes, all manufactured in India between two plants. We manufacture 17 active ingredients in India total. Principal products we export are the mancozeb-family products: mancozeb, maneb, zineb, propanib, and similar products. Acephate and chlorpyrifos are also key products we export, along with profenofos, malathion, and phenthoate — it's a long list. Our weakest link is herbicides. This is one segment we are working on to round out our portfolio.

We have identified five principal crops globally that we will be focusing on: soybean, corn, fruits and vegetables, cotton, and sugarcane — as well as rice, mainly for the

In what markets are you more interested in expanding right now?

We are present in almost all countries, but because of registrations we haven't reached all products in all countries. We are trying to expand further on that basis. We have a great presence in the U.S. — it's almost a \$100-million business, and one of the leading manufacturers of dicamba.

Do you see more demand for dicamba on the spread of weed resistance and the new dicamba-tolerant technologies hitting the market?

As the dicamba-resistant seed, which is developed by Monsanto, catches on, demand for dicamba is likely to grow, and we see a great market and potential for this product.



N.P. Nair

What did you discover at this AgriBusiness Global Trade Summit in Las Vegas? Any surprises?

This conference is a nice place to renew our contacts, develop customers, and strengthen relationships on this side of the world. This is a good contact point for the Americas, and it's a nice forum. We have been very busy over the last two-and-a-half days. Here, we get a real

feel for the market and competition, because at the same time (customers) meet with all 10 manufacturers. You get an idea of what everybody's prices are and things like that.

Can you offer your take on the Make in India plan? How do you see it playing out?

Make in India is a new initiative taken by the new Modi government, and we feel it is a good move toward developing new

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Glyphosate Ammonium Salt	Chlorpyrifos+Cypermethrin	1-Chloro-2-nitrobenzene
Glyphosate Potassium Salt	Imidacloprid	O-Phenylene diamine
Glyphosate Dimethylamine Salt	Acetamiprid	3,4-dichlorophenyl isocyanate
Glyphosate+Dicamba	Buprofezin	Sodium pyrophosphate
Glyphosate +2,4-D	Lambda Cyhalothrin	3,4,4'-trichlorocarbonyl chloride
Glyphosate+MCRA	Alamethrin	O-O-Dimethyl Phosphite
Glyphosate+Glufosinate	Emamectin Benzoate	Phosphorus Trichloride
Glyphosate+Oxyfluorfen	Spirodiclofen	Phosphorus Oxichloride
Diuron	Thiamethoxam	Sodium triphosphate
Quinclorac	Methomyl	Methyl chloride
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Glufosinate-ammonium	Thiophanate-methyl	Tris(2-chloroethyl) phosphate (TCEP)
Paraquat	Isopropylate-methyl+Myclobutanil	Isobutylate Triphenyl Phosphate (TCEP)
Azinphos	Acetamiprid	Agrochemical Adjuvants
Mosulfuron	Fenethalyl-Al	Agrochemical Adjuvants
Chlorpyrifos	Tebuconazole	Agrochemical Adjuvants
Chlorpyrifos	Mancozeb	Agrochemical Adjuvants
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Asian market, so we will be developing our portfolio based on these. We have an R&D team with roughly 20 scientists who work on post-patent products, so they do the reverse engineering, find a better way to make those products, and work on combination molecules and new, safer formulations. The next three to five years is an evolution time for us where we are really going to be moving these molecules to market, and the impact will be significant on our results.

Do you see the Indian landscape of small, fragmented farms changing?

Mammen: It has not changed, but what probably would change is access to information. The younger farmers are a little bit more technology-oriented. What is changing is mechanization of the farm with drone technology and other convenient technologies that are coming in. Managing the farm will become easier. Earlier, mechanization meant you needed to have a minimum landholding to run a large tiller or tractor operator. Now with drone technology coming in, you can do precision farming even for a small farm. I think that's what the young farmer is looking at: how to cut his costs of operation and still be more effective.

One big gap today in India today for the farmer to make his business remunerative is the ability to sell his produce. That's the biggest challenge for an Indian farmer, because that's where he's not able to capture the full value. If you look at Brazil, the farmers are very strong at selling — they sell to the commodity traders and know how the prices are moving. Whereas for the Indian farmer, he hardly gets 20% to 30%, or even less, of what the end consumer pays for the produce.

What is the main obstacle on that front?

Mammen: It's the structure. It's the middlemen who buy the produce. That fabric of the commodity segment has to evolve more in India. Otherwise, on the input side, I think a lot of companies are providing enough services. Other large companies like us are educating farmers, getting good products to them, and making farming a little bit less expensive. Finally, the output has to get in the right place. Only then will the whole value chain be covered.

How close is the Make in India plan to being implemented? In what areas would Indian companies have more trouble competing with the Chinese?

Srikanthan: The Make in India plan is only six to seven months old. Any change takes time. Sometimes you rush to get things done faster, but sometimes you realize that 'hey, probably we are not there.' In one to two years India will settle in. I think we are in the early phases of realizing what is and what isn't

possible. I think the government is very sensible. They are open to feedback — they are willing to look at it in a different perspective from what was originally planned.

We will evaluate what is feasible within ourselves, because there are some chemicals that are backward-integrated so well. There's no point in starting out fresh from zero-level. We will be very clear in terms of what we can do, in terms of our skillset. Definitely, for some

of the classical, older molecules for which the Chinese have economies of scale and years of mastering the learning curve, we will not be getting into those. I think there's a good amount of understanding in both of our countries.



Srikanthan

molecules in India. What was happening is that even with patented products that were just launched, people never used to take an interest in developing the product in India. I don't know what it was, but there was something in people's minds that told them it's too difficult to compete with the Chinese. They said, 'It's not possible; the Chinese are already there.' But, Make in India is giving a kind of confidence to Indian manufacturers and industry.

They are also trying to control import. If you really don't have any benefit of importing a Chinese product, why don't you buy it from India? There are manufacturers in India making good-quality material. Also, this gives an opportunity to recognize the difference in quality between India and China. People don't really look at that when China sells at for \$5.50 and India sells at \$6; they just blindly buy and don't look at the quality of the material or the advantages or disadvantages of buying Chinese material. Impurities could

play a negative role when you use it — it could be phytotoxic or cause other problems — so all of these things are getting highlighted.

It's definitely going to give a boost to Indian industry, at least for domestic sales. Internationally, it may not have such an impact.

What about biocontrols — are you interested in expanding into this area?

We are not in biopesticides, but it is catching up in India — it's a new buzzword. I feel people are getting more and more convinced about biofertilizers especially.

Demand for organic in India is growing, and people are willing to pay extra money for it. But unfortunately, the poverty level is high. Everybody cannot buy it. I feel organic cannot happen at 100% level, or even up to 50% is very difficult. When pests attack, organic doesn't give immediate control. It takes time. The organic control systems are also quite costly compared to that for chemicals.

Sulphur mills limited to Expand on Push for Newer Formulations, Biologicals

Bimal Shah, Director, describes ambitious plans for the company and his thoughts on distribution, the educational process, and Make in India.

Sulphur mills is obviously known for its namesake product, along with the traditional range of agrichemicals. Can you talk about your plans to expand in biologicals?

We don't see biologicals as a 100% complete solution to (replacing) agrichemicals, but definitely the market is increasing. Of course, bios have a problem with shelf-life and longevity of the product, which we're trying to address through our formulation technologies. We are not commercializing yet, but I do see in a year or so we should be launching a biological range of products, starting in India and then through the rest of the world.

What are the product types, and why now?

Some of them have IP protection so not going to get into specifics, but we're

trying better solutions that can almost replace fungicides or insecticides that are being used, and also be classified organic. These are biocontrols.

We have some innovative things we have done that have looked very good at lab-scale, so we can see how we can grow the size economically.

It seems to be a logical move with sulphur being your hallmark product.

We are the largest sulphur fungicide manufacturer in India. In the world we are No. 3 in this particular formulation, which is an 80%-solution fungicide or miticide used mainly in grapes and fruits and vegetables. Apart from that, there is another sulphur formulation we introduced, which is a 90% formulation, and we were the first to come to market with that around the end of 2007-08. That product works at one-fifth the dose com-

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Acetamiprid
Thiamethoxam
Diafenthiuron
Emamectin Benzoate

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2,4-D Esters
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Bispyribac Sodium Tech
Imazethapyr Tech
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Clodinafop Propargyl Technical
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Prometryn Technical
Propanil Technical
Simazine Technical
Sulfosulfuron Technical
Terbutylazin Technical
Terbutryn Technical
Diuron Technical



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Cyproconazole Technical
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How does distribution work in India?

The manufacturing happens in our plant, then the product goes to our 40 warehouses. Each warehouse has 10 or 12 people associated with sales or marketing around each particular location. We have a 10,000-dealer network, but the sizes the dealers cover are small. There is a product development team that goes to farm- and dealer-level explaining what the product is. At the farm level, there are small demonstration trials showing side-by-side comparisons of product performance.



Bimal Shah

but if his guys don't want the product, the stores don't want the product. Australia works similarly.

What is your perspective on Make in India?

I think it's good in ways, but it may have been done a bit abruptly. What was happening was there was a lot dumping of bad-quality product. China

is cheaper — that may be true, but quality was going down. A lot of material was coming and based on that they were having economies of scale. Now we're seeing China changing, too, because of pollution; India was already having those issues and we're trying to control that. So they said, whatever can be made in India should be made in India. There will be a gap in supply and demand. But they will look for alternatives.

Sometimes in a culture like India I feel crazy things could happen. If there's a bigger barrier, people will try to jump over it even more. A lot of companies in India had a lot of manufacturing capacity and we didn't even realize (the potential), because the Chinese government is giving a 15% rebate on what he is selling. In India you're not going to get a rebate, so how is the Indian manufacturer ever going to be competitive? It could be the other way around — that a duty would be imposed on imports. They did the same thing with the car industry by imposing a 225% duty, but that's how Tata became so strong.

But the automotive industry is not a necessity. Farming is a necessity, so you need to have more openness. I would prefer it if they would just increase the duty on the imports. On the other hand, if you put more barriers, cost, and requirements on the registrations, serious people are more apt to be in the business.

I'm fine with Make in India, but it has to be done in pace. Give the benefit to India. Here's an example: cartap. In India, there are probably 20 import registrations for cartap. Out of these, there are 17 or 18 who have a manufacturing registration (in addition to the import registration) — whether they make it or have ever made it is another point. There are one or two who can really make it. All of the product has been imported thus far. But do these companies that have the manufacturing registration have the capacity? It will take time.

How would you describe the educational process?

It takes a lot of work and needs a lot of push and commitment. Once the farmer is convinced, the commercial or pricing is not a worry because he's happy with the success. What we're trying to give to the farmer is a product per kilo, but something that gets him a return on his investment for his harvest.

What about investments in new facilities and new markets?

We have grown quite a lot. A couple of years back we were back at 25,000 to 30,000 tonnes of WG formulations. Now this year we should be at 60,000 to 70,000 tonnes and by the end of 2019, 100,000 tonnes.

Everything is made, formulated, and packed in India, and shipped to the 80 countries we operate in. In certain geographies there is more push. We have enough IP now gained in the formulation technology space to further expand.

South America is important. The market is big but of course the risks are also, with getting the money back around the distribution channels. The U.S. market is tricky, but we're there. Distribution is a challenge.

What makes the U.S. trickier?

Distribution. It's getting more fragmented. Earlier it was controlled by the top five, but I've been hearing there is less control now with smaller players coming into the space. The whole rebate system with the multinationals is also tricky. Here, you may have gold in your product and it won't sell. The whole pull comes from the end-user, the farmer. You can talk to the head office



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Meghmani Organics CEO Ankit Patel Shares Growth Plan

How is your 2017 shaping up, and what are your company's plans for the future?

Our Q1 has shown an increase of 21.1% to \$26.8 million, and we see 2017 as a good year for our business. We plan to ramp up production capacity to increase volumes and margins. We are going to add more capacities with backward integration.

Meghmani also will focus on developing the North and South American markets further, in particular the Brazilian market, and we expect to have a good outcome by 2020 in terms of registrations and product launch.

In addition to working on new chemistries expected to go off-patent in the next two years, we are establishing our own GLP lab, which should have accreditation by end of this year. This will certainly help in expanding our portfolio and markets.

What is your outlook for crop protection exports, given the major changes taking place in the industry?

With regard to the change in environmental policies particularly both in India and China, Indian exports are expected to gain more foothold in the international market. Indian industry is expected to grow at much faster pace as strict environmental regula-

tions are already in place in India and the industry is already fully equipped.

More markets are opening up for generics products and government policies are more inclined towards manufacturing base in India.

How will environmental restrictions in China and consolidation change the way Indian companies do business?

Environmental restrictions in China with many factories shutting down gives opportunities to Indian business.



Ankit Patel

Many existing manufactures and SMEs will have a chance to expand or start new businesses. India has many advantages in terms of low cost of production and a skilled work force. Having said that, we also have to find ways to counter the challenges in terms of environment. Cost is certainly going to face pressure on products from China. Prices will go up in long run and availability could

also be affected for some time.

Consolidation of the industry will also have positive impact on market especially for generic companies. It will give them ample opportunities to add more products into its portfolio.

How has India's domestic crop protection market changed in recent years?

Currently many companies are focusing directly at the farmer level by engaging in various programs. They are educating, and there is a technology transfer to farmers in terms of evaluating soil quality test, predicting weather conditions and many other factors directly affecting enhancement and yield of crops.

Meghmani has a very robust domestic team, and is conducting business through a network of more than 3,000 distributors. We are also engaged in technology transfer to farmer's level in key states including Karnataka, Punjab, Andhra Pradesh, Maharashtra, Madhya Pradesh, Rajasthan, and Gujarat. Farmer's education is an integral part of Meghmani culture.

We are focusing on developing our brand business by adding new products and regions.

Krishi Rasayan to Launch New Fungicide, Sharpen Focus on Herbicides

Q&A with Managing Director Atul Churiwal

How is your 2017 shaping up, and what are your company's plans for the future?

The year 2017 has been very challenging due to the new tax regime introduced in India, but we believe that we will be maintaining at least 10% growth this year. The company is consolidating its brand marketing and has launched two new combination insecticide products. We are also excited about launching on an exclusive basis a patented fungicide manufactured by BASF in India. We have also tied up with Acadian Seaweed to launch their new generation seaweed-based biostimulant, which is an IMO-certified product.

What is your outlook for crop protection exports, given the major changes taking place in the industry?

This year, we fear a major shortage of all the products due to the declining manufac-

turing capacity in China. Thus, prices will go up. This can be a good opportunity for Indian companies to expand their export base. We are also focusing in the export market and hope to double our turnover this year.

How will environmental restrictions in China change the way Indian companies do business?

The effects of environmental restrictions in China can be a huge opportunity for India. It will help Indian manufacturers to increase capacity and compete with Chinese on a long-term, sustainable basis. Even overseas buyers are switching their focus to India. A big area of concern this year could be shortages and price rises, as there is low inventory in trade channel. With fresh demand coming in and no supplies, there will be short supply in the market.

How has India's domestic crop protection market changed?

The Indian domestic crop protection market is growing steadily at the rate of 10% to 15%. The major factor is the increasing use of herbicides. Even the fungicide market is witnessing a sharp increase. For our company, with the launching of our patented fungicide and increased focus on herbicides, we hope to take advantage of this trend in the market.

Can you discuss your biggest challenges and how you are addressing them?

The biggest challenges are the frequent changes in the government policies and escalation in raw material prices. This is totally disrupting the supply chain. Further with the closure of many plants in China, it will put more pressure on the availability of stocks. I believe the challenge this year will not be about the creation of demand in the market but meeting the challenges of supplies. 🌐



Crop Protection Market Prepared for Return to Growth Mode

The M&A whirlwind continues to generate interest and opportunity for companies at all levels.

BY JACKIE PUCCI
SENIOR EDITOR

The *AgriBusiness Global Trade Summit* – Americas has a tradition of breaking attendance records, and 2017 is no exception.

More than 800 attendees from 45-plus countries representing more than 400 companies packed the *AgriBusiness Global Trade Summit* in Las Vegas, Nevada, while more than 130 exhibiting companies filled the Bally's convention center.

Kicking off the Summit on 8 August was a message of growth and optimism for the industry, from Dr. Bob Fairclough team leader for Kleffmann Group's agricultural input market trend information and consulting unit amis AgriGlobe. That optimism, of course, comes with a multitude of complex factors to consider, among them: the latest wave of M&A activity and the potential for more consolidation especially among Chinese and Indian companies, China's shrinking competitive advantage in sourcing, global trade agreements, regulatory shifts, and the peaking of new active ingredients falling off patent in 2015.

Although 2016

marked a second-straight year of declining sales for the global crop protection market, recovery is anticipated in 2017. Most companies' second-half results show a positive trend.

"We should start to see a 2.5% to 3% (annual) increase in the market over the next five years or so," Fairclough said. "That the industry will return to growth is without question as all the fundamentals for growth are in place."

In 2016, the global crop protection market dipped 2.6% to \$53.1 billion, on an ex-manufacturer sales level using the average exchange rate for the year. It was a far smaller drop than the 9.8% decline seen in 2015.

The United States retained its No. 1 market position in 2016, slightly ahead of Brazil, which Fairclough noted still has much potential for future growth versus the mature American market.

The biggest change last year, however, was China. Following years of swift expansion, the market there is facing a re-balancing, suffering an almost double-digit decline in 2016, in part due to the weather, currency, glyphosate prices, and the loss of paraquat, he said. Japan, in fact, was the only Asian market that experienced any growth last year.

The European crop protection market was flat, posting \$12.9 billion in sales,

yet still outperformed all other regions in 2016. Fairclough referred to it as the "game of two halves," wherein northern EU countries such as Germany, the UK, and Denmark performed worst due to weather and cropping, and France was held back by its Ecophyto plan. The other half — the Southern zone — including Italy, Spain, Greece, and Bulgaria, is performing better, helped by sunflower and fruits, while cereals and sugarbeet power Russia and Ukraine ahead.

Standout markets in 2016 included Argentina, helped by removal and reduction of export taxes on some agricultural products, and positive selective herbicide and soybean insecticide sales; and India, which experienced good monsoon rains. Signs look positive there for 2017 as well. Fairclough also highlighted Russia — which is seeing sharp growth in soybeans, vine crops, sugarbeets, and cereals — as a strong opportunity.

By crop protection sector, herbicides declined the most last year in part due to glyphosate resistance and prices. Insecticides also came under pressure due to changing pest pressure and regulatory issues, while fungicides experienced a small increase.

After the M&A Dust Settles

In their morning session kicking off day two of the *AgriBusiness Global Trade Summit*, Jim DeLisi, owner of Fanwood Chemical, and agchem industry veteran and consultant Alex Polinsky, took a historical look at merger and acquisition activity in the agchem market and shared what the landscape will look like when the most recent round is over.

That is, at least until the next M&A wave starts — probably 15 years from now, a continuation of the cycle of the last nearly half-century.

When the current merger activity dies down, control over the agchem industry by the top three new companies will be



Bob Fairclough delivers his keynote talk in Las Vegas on 8 Aug.

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extensive, DeLisi said. He expects BASF, which has a reported \$50 billion to spend in the space, will make a move at some point soon, likely on the sought-after glufosinate/LibertyLink assets that Bayer is poised to divest in order to satisfy regulatory authorities. Syngenta/ChemChina is probably the only other realistic bidder for the assets.

The new Bayer/Monsanto is widely expected to dominate the space once the dust settles in 2018, with ChemChina/Syngenta coming in at number 2 and Dow-DuPont close behind. BASF is projected to occupy a distant fourth, followed by FMC, with its acquisition of DuPont assets, at number 5.

Rounding out the top 10 players in the agchem space: Nufarm, UPL, Platform Specialty, Albaugh, Sumitomo, and AM-VAC. The next five are likely all to be Chinese manufacturers, DeLisi said.

With U.S. agribusiness having lost a staggering \$15 billion in value from 2008 through 2016 on the back of spiraling commodity prices, Polinsky discussed the need for innovation to continue – M&A, essen-



Jim DeLisi and Alex Polinsky previewed the agchem landscape post-M&A wave.

tially, represents the path of least resistance to keep revenue and profits high enough to support more R&D.

Mergers are also set to consolidate the distribution phase of the industry as everyone aims to get more out of the supply chain to drive profits back to their former healthy state, he said. On this front, keep an eye on two companies that could present the so-called “Amazoning” of the agchem industry: FarmTrade and Farmers Business Network (FBN).

“Firms like these could flatten the supply

chain and might be the beginning of the ‘Amazoning’ for grower supplies,” DeLisi said. “If the Chinese government does succeed in helping the export of finished and formulated products and gets into this kind of distribution network, it could eliminate a lot of costs involved in getting things to market.”

He added: “There is no doubt that the internet is coming to ag chemicals in a much bigger way.” 🌐

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Mahamaya Lifesciences Pvt. Ltd.

Growing Product Portfolio, Markets

What are the most important initiatives for your company in 2017?

Mahamaya has aimed towards increasing its product portfolio such that our customer can choose amongst the options. Till now Mahamaya's portfolio included only insecticides which confined us to limited market but in recent years Mahamaya has shifted its focus towards registration of other products, i.e. herbicides and fungicides. Currently Mahamaya is in midway of registering 4-5 herbicides.

Along with this Mahamaya has also invested to expand its overseas market especially in African and Latin American and in the process Mahamaya has opened its overseas office in Dubai, UAE.

What do you view as the top three trends or opportunities in the coming year? (Products, markets, or economic conditions)

The forecasted monsoon in India for this years is encouraging (98%). We are expecting to have a good monsoon throughout the country.

Secondly, the percentage share of insecticides used in India is still highest i.e. around 50% among herbicide and fungicide, which provides a good opportunity to Mahamaya's current product portfolio.

Also, there has been an increase in the percentage share of herbicides used for controlling the weeds and is expected to be the largest group of pesticides used in the agriculture in near future. This is mainly due to unavailability of farm labor and increased awareness of crop protection methods among the farmers.

Thirdly, the government's initiatives and proposed reforms in agriculture sector will enhance the purchasing

power of the farmers.

What products contribute most to your growth strategy or core business? Why?

Mahamaya's business currently revolves around insecticides only, which has been our strength. Also, emamectin benzoate and imidacloprid are among the top revenue generating molecules. Currently there are only 3-4 companies that have access to these active ingredients in India. Beside this, emamectin is recommended on more crops now including tea and pulses increasing the total area for emamectin usage in India.

Imidacloprid demand is also likely to increase because of a boom in construction sector (recommended for use in termites control).



Mr. Krishnamurthy Ganesan,
Managing Director

What is your general outlook for agriculture economies, product demand, materials pricing, and revenue for 2017?

The agriculture sector in India is expected to gain better momentum in the next few years due to increased investments in agriculture infrastructure, positive monsoon forecast, and new development initiatives from the Government of India towards farming community. The demand of herbicides is likely to increase at higher pace as compared to insecticides and fungicides.

But as we all know there are certain constraints in every path of development, and so is the case here. There are likely chances of huge gap between demand and supply of pesticides in India due to shutting down of agrochemical manufacturing units in China and recent proposed changes in the import guidelines for agrochemicals in India to reduce the total import.



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Hundreds of AgriBusiness Global Trade Summit delegates gathered at the opening night cocktail reception, sponsored by Sulphur mills limited, on 8 August, 2017.

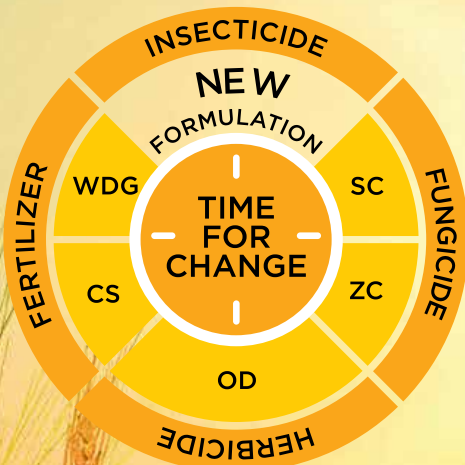




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India Has Room to Grow

BY PRADEEP SHARMA &
DR. BOB FAIRCLOUGH
KLEFFMANN GROUP

India is growing and it is growing at a fast pace. The growth has been seen on every front — population, social, and infrastructural. This has put strain on agriculture as a sector because of the dependence of a large part of the population on it. Crop protection chemicals, in turn, play a very important role in supporting this estimated 70% of the population that is dependent on agriculture. Offsetting the benefits of crop protection to some extent is a deteriorating climate that has added to the misery of farmers.

In recent years this growing pressure on agriculture in India has increased the use of crop protection chemicals by farmers to manage pests, diseases, and weeds. These chemicals also help in increasing the yield of the crop, which is critical when land is becoming a scarce resource needed to cater to the requirements of food, animal feed, and energy crops. Globally, as in India, these chemicals have helped farmers to improve production and keep up with the pace of food demand.

While the Asia-Pacific region is the larg-

est global market for crop protection products, India in particular offers even greater growth potential for the industry going forward. This is in part due to rapid population growth, improving economics, and reduction in arable land. As an illustration of potential with use of crop protection products as of today, it is estimated that still more than 20% to 30% of the total produce is destroyed by pests and diseases in India and cause an annual crop loss of INR 50,000 crore (\$7.5 billion).

Research reports have shown that Indian farmers need to increase the use of crop protection chemicals, however, due to lack of per capita income, low awareness, education levels, and limited reach, India is still far behind other countries in terms of crop protection products usage. This creates a huge untapped market, offering tremendous growth potential in India's crop protection industry.

Crop Protection Industry Structure

India's crop protection industry is generic in nature and around 80% of the molecules are non-patented.

According to Pesticide Monitoring Unit (GOI) there are about 125 technical-grade manufacturers, (including about 10 multinationals) more than 800 formulators, and over 145,000 distributors in India. Over 60 technical-grade pesticides are being manufactured indigenously.

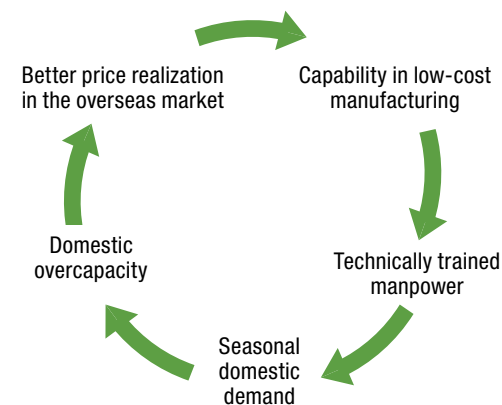
Crop protection chemicals are manufactured as technical grades and converted into formulations for agricultural use. The crop protection industry consists of technical grade manufacturers, formulators producing the end products, distributors, and end use customers.

Technical-grade manufacturers sell high purity chemicals in bulk (generally in drums of 200 to 250 kg) to formulators. Formulators, in turn, prepare formulations by adding inert carriers, solvents, surface active

Chart 2

India's Export Cycle

Several factors suggest India has room to grow as a manufacturing center.



agents, etc. These formulations are packed for retail sale and bought by the farmers.

Indian Crop Protection Market – As an Industry

India is among the world's leading crop production manufacturers in the world, in fourth place after the U.S., Japan, and China. The industry is exporting approximately 50% of its volume with the rest consumed in the domestic market.

As per the report presented by FICCI in collaboration with TATA strategic management group, the Indian crop protection market will keep on growing at a steady pace. It is estimated that the overall value of production (export and domestic) is approximately \$4.25 billion and this will reach \$7.5 billion in year 2019. Exports will account for the bulk of the increase, growing by some 166% whereas as the domestic market will grow from \$2.2 million to \$3.3 million.

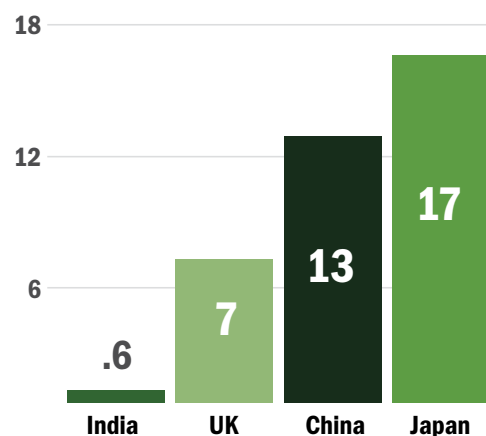
Kleffmann AgriGlobe® data shows that the Indian crop protection domestic market was estimated at the \$2.1-billion level in 2016 growing after what was a difficult year in 2015, agreeing with the FICCI / TATA conclusions.

In terms of overall exports from India, agrichemicals contribute a good chunk of the total value exported out of India. Within the total exported commodities, agrichemicals amounted to some 5.19%

Chart 1

Average Kg/Hectare — Use of Agrichemical

India lags behind most countries in terms of the amount of crop protection product used per hectare.



continued on page 22



Heranba Industries Ltd.

Delivering Solutions, New Products

What are the most important initiatives for your company in 2017?

Metaphenoxy Benzaldehyde (i.e. MPBD) is a key raw ingredient required in our manufacturing process. Taking this into consideration we decided last year to go for backward integration and produce this product in-house, and recently we have successfully commissioned this plant. The output for this product will add to our product portfolio. This product is in demand throughout the year within India and in exports; this will add to our turnover and profitability.

In our domestic brand segment, we have introduced 10 molecules this year, which will improve our product portfolio further in the Indian market.

What do you view as the top three trends or opportunities in the coming year? (Products, markets, or economic conditions)

India is among the four largest manufacturing countries in the world for agrichemicals.

In India the potential comes from the availability of new molecules being developed, the many niche molecules going off-patent, and the land area available for cultivation. Irrigation facilities are also increasing; farmers are adapting to new methods of agriculture, and they're ready to use new molecules.

Monsoon, which plays a major role, has been good this year, which increases product demand.

Our government in recent years has also taken many steps to safeguard farmers' interests with more initiatives and policies.

What products contribute most to your growth strategy or core business? Why?

Our core strength is in manufacturing of pyrethroids. There are very few manufacturers globally, and there is continuous increase in demand, for which we have been regularly enhancing our capacities to produce.

Also, addition of products like MPBD this year will give further strength to our core business.

Apart from this we are also very strong in our formulation division, which caters to both the domestic and export markets; our domestic brands are very well established and are catering to more than 5,000 dealers and distributors in India.

Our products are also widely used in public health tenders, as they have WHO approval.



Mr. R.K. Shetty
Executive Director

What is your general outlook for agriculture economies, product demand, materials pricing, and revenue for 2017?

In India, agriculture plays a major role in the gross domestic product (GDP) of Indian economy and will continue to be of utmost importance to many countries worldwide. With good monsoon this year in India and across the globe product demand will continue to be high. With emerging new molecules and increasing demand for generic molecules, the price realization will be also better and in turn improve the revenue for all the companies. Our focus on backward integration will also help in our pricing strategy.



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Chart 3

India's Crop Protection Players

According to Pesticide Monitoring Unit (GOI) there are about 125 technical grade manufacturers, (including about 10 multinationals) more than 800 formulators, and over 145,000 distributors in India.



of the total value in 2015-16. Indeed agrichemicals are within the top 10 commodities that India exports, illustrating the importance of the industry to the nation. The U.S., Asia, and Europe are India's major exporting destinations.

Despite being second to China in terms of generic pesticide production capabilities, India has been historically a key source of technical material and final formulated product utilized in the global market. This has been particularly so for insecticides historically and increasing so now for fungicides. Pressures on the Chinese "production machine," especially the new environmen-

tal regulations and constraints, are making Indian-manufactured material increasingly competitive on the global market.

Export opportunities

For contract manufacturing and exports of pesticides, key growth drivers include India's capability in low cost manufacturing, the availability of technically trained resources, seasonal domestic demand, over-capacity, better price realization globally, and a strong presence in generic pesticide manufacturing. Patents will expire on agrichemicals with a value of \$4.1 billion by 2020, many of them in the insecticide

sector, which is traditionally the area of strength for Indian manufacturers. This provides significant export opportunities for Indian companies who have expertise in manufacturing generic products.

Domestic opportunities

In the past, the availability of cheap labor for manual weed picking has limited growth for herbicides. But today's labor shortages and rising labor costs have increased use of herbicides historically with an increase of some 15% anticipated over the next few years. Although still the smallest sector (as compared to insecticides or herbicides), fungicides have almost doubled in value over the last five years and growth is expected to continue in this high-value sector.

India remains a country of very low consumption of pesticides and on a per-hectare basis; consumption of pesticides in India remains amongst the lowest in the world — 0.6 kg/ha compared to 13 kg/ha in China. Over time usage will inevitably increase to help boost yields. 🌐

Dr. Bob Fairclough is the team leader for Kleffmann Group's agricultural input market trend information and consulting unit amis AgriGlobe. He is an editorial advisor to AgriBusiness Global. Pradeep Kumar Sharma, Key Account Director for Kleffmann Group, a global research and data consultancy that offers monthly analysis to AgriBusiness Global based on its in-country surveys of farmers. Find out more about Kleffmann's amis AgriGlobe, a database of pesticide and seed use, at www.kleffmann.com.

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Biocontrols Africa attendees share personal experiences and best practices on a variety of topics during the conference.

Communication Key in South African Biocontrols Industry

Sessions focus on need for whole industry to come together to expand and promote biologicals in the country.

BY CHRISTINA HERRICK
SENIOR EDITOR, AMERICAN FRUIT
GROWER, WESTERN FRUIT GROWER

Communication. It's essential to all parts of agriculture, and the biocontrols industry in South Africa is no exception. Which is why the inaugural Biocontrols Conference and Expo in Cape Town was the perfect setting to bring all stakeholders to the table.

Growers, distributors, and suppliers attended this two-day conference to connect, discuss the current status of the biological industry in South Africa, and where the industry is going.

The theme of communication was echoed throughout the first day of presentations held at the Southern Sun Cape Sun. The conference was organized by *Agri-Business Global* in conjunction with the South African Bioproducts Organization (SABO).

"This is a great opportunity to connect with stakeholders, something that doesn't happen often," said Johnathan Mudzunga, the Director of Directorate of Agricultural Inputs Control with the South African

Department of Agriculture, Forestry, and Fisheries.

It was Andre Fox, chairman of SABO as well as the CEO of Madumbi Sustainable Agriculture (Pty) Ltd., who said South Africa was the prime location to hold the conference, and by 2020 the biological industry in South Africa will be a \$5-billion industry.

"There's an industry here, it's thriving," Fox said.

"There's an industry here, it's thriving."

—Andre Fox, Chairman of SABO

Mudzunga echoed Fox's assertion noting that as the dialogue with SABO and other stakeholders in the biological industry in South Africa, more biologics have been registered. The transparency of process and communication has been well-received.

Mudzunga said SABO helped fill a need for a "platform to communicate with the sector, as regulator. That platform [SABO]

allows us to engage with one another."

Involving all stakeholders is an important part of the biological product registration process. While communication is vital, having standards that are more uniform worldwide will help in bringing new technologies into the market at a faster pace.

José João Dias Carvalho, Head of Global Business Development and Regulatory



Policy, Agro Dossiers, Dr. Knoell Consult GmbH, likened the attempt to create international harmonized MRLs to the different types of international electricity plugs, which amused the international attendees who no doubt needed adapters for South African plugs.



Coromandel International Limited

Moving from 'Good to Great'

What are the most important initiatives for your company in 2017?

Coromandel International Limited, India's second-largest phosphatic fertilizer player, is in the business of fertilizers, specialty nutrients, crop protection, and rural retail.

Coromandel has a pan-India presence for distribution of these products, besides its own retail outlets. Coromandel has ventured into the retail business and has set up close to 800 rural retail centers in the three southern states. The company clocked a turnover of \$1.57 billion during FY 2016-17. Coromandel was voted as one of the top 10 greenest companies in India by TERI, reflecting its commitment to the environment and society.

What do you view as the top three trends or opportunities in the coming year? (Products, markets, or economic conditions)

For the year 2017, Coromandel has chosen "Good to Great" as its theme for the year. This theme reinforces the company's various initiatives in research and development, process and safety management systems, responsibility towards environmental compliance, and corporate social responsibility.

Coromandel's crop protection division has a state-of-the-art R&D center "Coromandel Innovation Centre," located at Hyderabad, India. It is committed to provide crop protection solutions through developing cost-effective manufacturing process for agrichemicals and its intermediates. This research center also undertakes the development of agrichemical

formulations/combinations, analytical methods, and improvement in effluent management systems. The center houses more than 25 highly experienced and qualified scientists.

The quality-control approach at Coromandel's manufacturing sites is based on a policy of Zero Defect. It has systems for monitoring at every stage, right from sourcing, manufacturing to post production. Of paramount importance are the aspects of environmental safety, eco-toxicology, and effluent management. The effluent treatment plant and processes are comparable to the best in the world. The safety of its employees as well as of the society is a matter of prime importance. The plants are ISO-certified and follow SHE policy (Safety Health Environment), PSMS (Process Safety Management Systems). The company has recently set up a manufacturing facility at Dahej, Gujarat, which is Special Economic Zone to cater to the export market. With this, the company now has three active ingredient manufacturing facilities and three pesticide formulation facilities.

What products contribute most to your growth strategy or core business? Why?

Coromandel's Crop Protection business ranked among the top 5 companies in India. The company's portfolio includes several popular brands that enjoy leadership status in India and abroad.

Coromandel exports its crop protection products to over 65 countries. Coromandel is one of the major players in mancozeb business globally.



www.coromandel.biz/



But, the truth behind Dias Carvalho's electricity plug comment was to discuss the difficulty there is in getting countries on the same page when it comes to registrations.

He said the lack of broad organizations in the EU to regulate MRLs means there are 30 different organizations with individual standards and approvals. This results in newer technologies not being approved as quickly as older chemistries are pulled as

part of EU Regulation 1107/2009 and add to that challenge, for companies seeing to introduce new products, MRL, active ingredient, and substance are all individual EU approvals.

"It's not predictable when it's going to happen — you do not have time to react," Dias Carvalho said of Codex's active substance review. This is problematic, he said.

He also cautioned those biological

manufacturers in the audience to be aware of how biologicals are defined, because it is possible those definitions could affect whether a product coming online has MRLs or not.

"For the basic substance, there is no need for an MRL. If nobody applies for MRLs [in the EU], you will get the default 0.01 mg/kg," he said. "That's where lots of problems are coming from — this default."

While navigating EU approvals and standards may be challenging, the industry may look to a different solution, where there are country-specific, native strains of biologicals to commercialize, said Matieyedou Konalambigue Abdou, Managing Director of Aflasafe Technology Transfer and Commercialization Program, International Institute of Tropical Agriculture.

Abdou said this may provide an easier route to approvals, instead of importing biologicals and then subjecting them to each country's approval standards.

Mudzunga echoed this sentiment when he talked about the challenges to harmonization within South Africa when it comes to approvals of biologicals and other crop protection chemistries.

"Issues of harmonization are difficult," he said. "At a technical level, it looks like it is a difficult issue."

Mudzunga said the department is looking at ways to help streamline the registration process. He is also hopeful that policies will be created to reduce growers' dependence on traditional chemistries and increase biological use.

Communication also extends to the end user of the products as Shimon Steinberg, Head of Research and Development for BioBee Sde Eliyahu Ltd., pointed out. However, in speaking to distributors, he said the challenge for companies is to get growers to understand that biologicals are different than traditional chemistries.

"They're not a 'launch and forget,'" he said. Growers need to realize that monitoring and trapping become a component of biological use.

"The major challenge is to tell [growers] 50%, 60%, 70% [efficacy] can be good enough in certain circumstances," Steinberg said. 🌐

Herrick is the Senior Editor of American Fruit Grower® and Western Fruit Grower® magazines. Contact her at: CMHerrick@meistermedia.com

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Biostimulant Growth Prompts Need for Intellectual Property Rights

Innovation is curtailed without some protections and the associated profit.

BY TOM CRAIN
CONTRIBUTOR

Biostimulants are one of the bright spots in agriculture today holding the key to improved efficiency, increased yield and greater sustainability, according to the U.S. Biostimulant Coalition. “Over the next few years, the biocontrol and biostimulants market is expected to grow over 10% per year, and by 2025, it’s projected to hit a whopping \$4.1 billion in sales,” says David Beaudreau, co-chair of the U.S. Biostimulant Coalition.

Yet, the rules and regs have failed to catch up with the skyrocketing popularity of these products. “The technology remains open to interpretation by state and federal regulators,” adds Beaudreau. “And this creates misunderstanding, placing these products under regulatory schemes that do not adequately account for their inherent safety or perceived risk.”

The regulatory atmosphere surrounding biostimulants remains an enormous challenge in most countries. Similar to biopesticide or biocontrol substances, regulations for biostimulants is mired in fog. Recently, some countries are beginning to shed a little light on these regulations — even though still it’s a flickering flame.

There is no question the global regulatory environment regarding biostimulants is changing rapidly and trending towards biopesticide-type registration requirements, according to Arysta. “The major challenges include lack of a clear global definition of what a biostimulant is and, consequently, significantly divergent regulation and registration requirements by country,” says Neil Stapensea, Arysta LifeScience marketing

director of Plant Stress & Stimulation.

“Most countries put biostimulants into a subcategory under fertilizers, and some put it into the hormones category under agrichemicals management,” explains Haiguang (Bill) Duan, Leili Group Vice President of International Business.

On algal biostimulants, China has established clear regulation and criteria on alginic acid under the category of soluble fertilizers. The REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) regulation in Europe, which aims to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances, has paved the way for such development,

but it covers chemicals and excludes microorganisms, which are important categories of biostimulants.

In the U.S., there is still no agreed-upon legal definition for biostimulants. In addition, fertilizers and related products are registered and regulated at the state vs. federal level, adding to the challenge.

“Under the current U.S. regulatory framework, biostimulants are sold as low-analysis fertilizers, soil amendments, or ‘other beneficial substances,’” says Michael Totor, President & CEO of Agricen. “The use of the word ‘biostimulant’ is not allowed on the label. This is in contrast to biopesticides, which are defined and regulated at the federal level.”

Federal regulators at the U.S. EPA have acknowledged the existing gray areas with respect to this category of products. The EPA has been working with the biostimulant industry and related stakeholders to de-

velop guidance that will help clarify some of these murky regulatory issues.

IPR Challenges

So, it stands to reason that when it comes to Intellectual Property Rights (IPR), biostimulants pose another particular set of difficulties.

“Patentability and prevention of copies or reverse engineering of the biostimulant products are often difficult,” says Patrick du Jardin, Plant Biology Unit Professor, Gembloux Agro-Bio Tech, University of Liège, Belgium. He also serves on international committees of ethics currently for the National Institute for Agricultural Research (INRA) and the Center for International Cooperation in Agricultural Research for Development (Cirad) in France.

Du Jardin explains that the originality of the product and its status of invention, as demanded by patentability, is sometimes difficult to establish, and companies tend to patent the industrial processes used for the production of biostimulants.

“Data protection mechanisms coupled to the mandatory registration of biostimulants would strengthen protection of intellectual property,” du Jardin adds. “Data sharing mechanisms linked to the registration of biostimulant substances or microorganisms would support the development of the biostimulants market by promoting industrial exchanges and partnerships.”

How crucial is IPR to the biostimulant industry? Many specialists in the industry believe it’s a complex question, including Stapensea. “Ultimately, there has to be a balance between incentives to invest in research to develop advanced crop production techniques and technologies with market access to those IPR technologies and ideas,” he says. “It has its own lifecycle, and



*Michael Totor,
President & CEO,
Agricen*



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it's getting shorter, putting more short-term pressure on margins. Simply put, we can't have sustainable innovation without IPR and the associated profit incentives."

But most specialists also say the advantages for securing IPR far outweigh any disadvantages, helping the industry grow in a more healthy and sustainable manner. "Biostimulants provide different effects on crops through different mechanisms," says Duan. "When companies like ours (Leili) research more specific mechanisms and functions, IPR is necessary to protect our investments. IPR can help growers know exactly what the real functions are from biostimulants."

Stapensea sees IPR as one key tactic, but also believes registration, mode-of-action definition, go-to-market strategy, integration with conventional crop protection and market footprint also play roles in terms of competitive vigor. "The biostimulant category tends to consist of generally old, undifferentiated technologies, but as this segment continues to grow and gain market acceptance, development of new technologies will play an important role."

Duan says creating mixtures is one of the

most important roles in IPR, and Stapensea expects pre-formulated mixtures will become increasingly important to both differentiate and possibly reposition old active substances as well as adding application convenience for the end user.

"Different mixing on percentage, substances and materials can give different specified effects on crops," Duan says. "But this mixing should be truly with technology and produce innovative value. Simple mixing can not survive in the market in the long run."

For most biostimulant manufacturers, IPR is a key measure for remaining competitive. "Along with our sister company Agricen Sciences, R&D is a priority for us as we develop new technologies," says Totoro. "We want to be sure we can properly protect any intellectual property that is developed from our R&D."



Accomplish LM is a fertilizer catalyst designed to significantly increase fertilizer availability and overall plant health.

Agricen's primary concerns relate to the ability to protect what it develops. "We want to make sure we are able to pursue proper protection, either by patent or trade secret, in both the U.S. and other countries in which we operate," he says. "The key advantage of IP is that we believe we are developing differentiated technologies for the growers, and a proper IP protection strategy allows us to get those technologies into the market." 🌐

Tom Crain is a freelance writer based in Cleveland, Ohio. Contact Tom at tcrain1@gmail.com.

HANSEANDINA to be present with B2B concept in more than 20 countries in 2023 globally

Interview with Jan Onnen, Head of Hanseandina



Q1. Briefly introduce us to the Business Concept and expansion plans of HANSEANDINA?

HANSEANDINA is privately owned and was originally founded in 2008 in Colombia. Today the Headquarter is located in Reinbek in the north of Germany.

We are a B2B-Company and sell all of our products on CFR Level to the Importing Pesticide Industry, cooperating as our distributors with Off-Patent Multinationals and Local Big Importers, which means, that we work without an own local distribution network.

HANSEANDINA's growth will come from adding new countries & products to our range and this is not only in Latin America, but also in Asia-Pacific, Europe and Africa, where we have already set up branches and started registration work. Our vision is to be present with our B2B Concept in more than 20 countries in 2023 globally.

Q2. We understand that HANSEANDINA's concept is based on innovative pesticides, what do you think of the competition situation in your current markets?

Our innovative products are not delivered on their own, they are bundled with training service, marketing support and strong branding concepts, as otherwise new great solutions would drown in the saturated markets and not even get near to the final consumers, who are the Farmers.

You can see companies in small and medium sized markets in Latin America, I exclude here Mexico, Brazil and Argentina, today look for growth obviously by renewing their portfolio but specially by starting in new markets or countries.

This is a signal that their traditional native markets are saturated and most probably growing the existing market share is difficult. As B2B-Company we see all existing and coming importing companies as our potential partners, we look for a dialogue to make a joint portfolio gap analysis and can develop this way innovative products for each company.

Q3. Please give us your summary in few words of what you expect in the coming months and years in the global pesticide market?

Very strict environmental policy in China will affect supply and pricing of many products, „Make in India“ policy will put more Volume of Chinese Producers into the global market, Mergers of R&D Companies will open large opportunities to the generic players. Vielen Dank & Muchas Gracias.



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As ABIM Turns 12, Biocontrols Continue to Grow on a Global Scale

Educational sessions to cover market development, regulatory affairs, innovations, and novel products for plant protection.

BY DAN JACOBS
EDITOR

Biological controls are the oldest form of pesticides dating back to when agriculture first allowed people to settle in a single place. But the focus on biological controls as viable crop protection products with science and efficacy data is considerably more modern.

The Annual Biocontrol Industry Meeting (ABIM) is internationally recognized as a global platform for the industry to network, discover, and unveil new products, market opportunities, and research areas. In addition to promoting biocontrol and networking, it is also a platform to liaise with and inform policy makers and regulators of the specific needs of this growth industry. Now in its 12th year, ABIM returns to the Congress Center Basel, in Basel, Switzerland, 23-25 October. ABIM is a joint project of the

International Biocontrol Manufacturers Association (IBMA) and the Research Institute of Organic Agriculture (FiBL.)

Last year's conference saw nearly 900 delegates from 48 countries representing more than 400 companies and organizations from around the globe. The scientific program

includes eight sessions with more than two dozen presentations covering market development, regulatory affairs, and novel products for plant protection. An exhibition is the core of the congress, giving scores of companies an opportunity to share their products and services.

Day one's pre-aperitif keynote presenter comes from a company that has been dedicated to biocontrol for half a century. Paul Koppert, of Koppert Biological Systems, will talk about the company's 50-year focus on this rapidly growing market segment.

Day two's keynote speaker Ulrich Kuhlmann, CABI, will present on "Uptake of augmentative biological control solutions by extension services in Africa and Asia."

The educational sessions begin on day two with a look at EU regulatory issues. Plenary session 1 will be chaired by Willem Ravensberg, President IBMA, and includes four presentations, including one from IBMA's Ulf Heilig and David Cary who will discuss the IBMA's strategy for regulation of biocontrol.

Plenary session 2 follows with a look at global regulatory issues. Among the presentations will be José Carvalho (Knoell Consult) who will explain regional regulatory differences in accounting for advances in biopesticides and Imme Gerke, whose presentation is titled, "One Data Package for the Whole World."

One of the popular portions of the congress is the opportunity for one-on-one meetings. The customized ABIM 2017 1-to-1 meetings utility allows congress participants to arrange meetings with other visitors online. Such meetings can be arranged long before or just a few hours before the event. ABIM takes care of the meeting place, you just need to contact the fellow delegate you wish to meet and arrange a mutually acceptable time.

On day three, the opening plenary session is chaired by David Cary, Executive Director, IBMA. The session will explore "Innovations influencing implementation of biocontrol."

A full list of sessions and presenters can be found at: abim.ch/programme.html



David Cary, IBMA Executive Director, opens the 2016 edition of ABIM.

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Counterfeits Disrupt Uganda's Agrichemicals Market

Mislabeling, label imitation, and reuse have hampered efforts to combat the fall armyworm.

BY **SHEM OIRERE**
CONTRIBUTOR

The outbreak of the Fall Armyworm (*Spodoptera frugiperda*) in East Africa in late 2016, particularly in landlocked Uganda, and the rush by government to prescribe two pesticide combinations to counter the spread of the pest, helped illustrate the region's counterfeit agrichemicals problem.

Ugandan farmers complained in early April 2017 the prescribed pesticides were hard to access and unscrupulous dealers were selling counterfeit chemicals hampering their efforts war against the pest.

"The recommended chemicals are not easily available and what some outlets are selling are counterfeit pesticides," said Patrick Matovu, a farmer in Luweero District.

The Ministry of Agriculture Animal Industry and Fisheries has recommended the use of a pesticide combination of Lambda-cyhalothrin (106g/l) and Thiamethoxam (141g/l) also called Striker 247SCSC or Engo K 247 SC and also Profenofos 40% + cypermethrin 4% or Rocket 44EC at a rate of 20-50 mls in 15-20 liters of water.

However, Agriculture Minister Vincent Ssempijja said the use of the two pesticides is an emergency measure since Uganda "is exploring more sustainable management measures. Research is ongoing to establish long-term effective and robust control measures of the pest," he told media in April.

Uganda estimates yield loss of 15% to 75% that translates to at least 450 metric tons of maize valued at \$192 million.

Although the director of crop resources at Uganda's Ministry of Agriculture Dr. Opolot Okasai, says the complaints of counterfeit pesticides for controlling the fall armyworm are being investigated, recent studies

have shown counterfeit agrichemicals in Uganda have several causes each calling for a unique approach in helping salvage the country's crop protection segment.

In maize-growing districts where the two pesticides have been used according to guidelines provided by the Ministry of Agriculture "the maize crops are recovering," Okasai said. The implication is that failure to comply with guidelines on use contributed to or caused the ineffective outcome.

In March 2017, Uganda set aside \$2.3 million from the national treasury in support of the fight against the pest. Part of the funds was for procuring the two emergency pesticide combinations, purchase of light, and pheromone traps for pest surveillance, procuring motorized pumps, and mobilization of communities to carry out the agreed control measures.

Sale of counterfeit pesticide complicates the war on the fall armyworm as the pest is likely to develop resistance and wreak havoc in the country produces nearly 4 million metric tons of maize annually.

Croplife Africa and Middle East lists Uganda as a counterfeit and illegal pesticide hotspot alongside Egypt, West Africa, and Tanzania although the counterfeit problem cuts across the African market with a pesticide market value of \$1.5 billion to \$2 billion.

Uganda's Anti-Counterfeit Network says suppliers and dealers in genuine agrichemicals and farm inputs have gone out of business because of increasing volumes of counterfeits in the market.

Uganda has an estimated 2,600 agro-dealers with only 50% of them being registered through Uganda Agro-input Dealers Association, the national apex organization for all agro-input dealers in both rural and urban areas of Uganda.

Uganda, which has a crop protection market value of about \$30 million, is grappling with delayed passage of the counterfeit bill that is held back because of disputes over its inclusivity and enforcement.

Uganda's Minister of State for Trade Michael Werikhe says the counterfeit bill focuses on both imported and locally produced products.

"The bill is not only talking about externally sourced products only but also that products manufactured in Uganda should be genuine and imitations should be banished from the market," he said.

But the problem, according to Everest Kayondo, chairman of Kampala Capital City Traders Association, is the counterfeit bill leaves out substandard products. "We need a law that addresses both counterfeits and substandard products," he said.

In April 2017, Uganda's Anti-Counterfeit Network said the country has existing laws on dealing with counterfeits but the enforcement is weak.

"The challenge is that the punishments were not stringent enough: this is why we need the bill passed because the punishment under the penal code Act 1950, are not so severe," says says Fred Muwema, Legal and Corporate Director at the Anti-Counterfeit Network.

A draft report prepared for Bill and Melinda Gates in collaboration with Monitor Deloitte said counterfeiting in Uganda is also prevalent within herbicides.

The report identified mislabeling, label reuse, and label imitation as the main types of counterfeiting within Uganda's agrochemicals industry. 🌐

Shem Oirere is a freelance journalist based in Nairobi. He can be reached at oirereo@yahoo.co.uk.





Nitrogen Management Highlights Conference on Precision Agriculture

Bringing together traditional and non-traditional ag partners is necessary for a successful future for agriculture.

BY DR. STEVE PHILLIPS
DIRECTOR, INTERNATIONAL PLANT
NUTRITION INSTITUTE

The European Conference on Precision Agriculture (ECPA) was held recently in Edinburgh, Scotland. This 11th conference, which comes under the auspices of the International Society of Precision Agriculture (ISPA), marked the 20th anniversary of the ECPA. The conference was well attended with more than 300 delegates and approximately 140 oral presentations. A wide range of topics was presented including crop and soil sensing, satellite and unmanned aerial vehicle (UAV) applications, precision irrigation, spatial crop models, decision support systems, and engineering. One of the most popular breakout sessions focused on precision N management.

One of the highlights from the N session was a research project conducted by Dr. John Grove at the University of Kentucky. The work looked at various methods to create nitrate-N phytoremediation areas. The results indicated that site-specific

technologies could guide establishment of N- scavenging cover crops; however, there were some issues with using N balance estimates from yield data. They reported that actual N content in the harvested corn grain was too variable to use published grain N concentration values and attempting to do so resulted in inaccurate recommendations for cover cropping. Grove indicated that yield maps might be best used to delineate areas of similar crop performance and then ran-

compared with conventional N management practices. Their results showed significant reductions in nitrate-N concentrations and modeled N load losses following the VRN application. The VRN strategy also improved crop N use efficiency and had no effect on grain yield compared with the conventional uniform rate application.

Another interesting presentation was from Dr. Daniel Kindred of ADAS, the UK's largest agricultural consultancy. They

“The biggest challenge going forward [for PA researchers] is to develop and to deploy systems that help farmers turn data and information into decisions.”

dom sampling within those areas be done to provide more optimal information.

Dr. David Mulla at the University of Minnesota also presented research from the U.S. His group was evaluating the effect of crop sensor-based variable rate sidedress N fertilizer applications (VRN) in corn on nitrate-N leaching, nitrate-N loads and grain yield

looked at the variation of N fertilizer requirement across a field and various systems to assess its predictability. Their results showed large variation in both yields and N requirements, but gross margins associated with perfectly matched N applications were modest across fields. Their conclusion was that it was much more important from an

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economic perspective to use precision technologies to identify an accurate average N fertilizer rate for the whole field than to account precisely for within-field variation.

Another important conclusion, from an academic perspective, was that conventional replicated, randomized research trial designs are largely imprecise due to soil variation and even the trial location within a field can fundamentally affect its conclusions. They proposed a more effective “chessboard” design to address soil-related, intra-field yield variation. Kindred and other scientists at ADAS envision series of chessboard trials among a network of precision farmers to make coordinated comparisons that will bridge science and practice, empowering both farmers and researchers.

The synergy between science and practice was also the main point delivered by Dr. Ken Sudduth, Research Agricultural Engineer with USDA-ARS and ISPA Past President, during his keynote address titled “20 Years of Precision Agriculture.” Dr. Sudduth noted that the “biggest challenge going forward [for precision agriculture researchers] is to develop and to deploy systems that help

farmers turn data and information into decisions.” He cited several technological advancements that have occurred over the past two decades but pointed out that “technology can’t replace people” and that “models and decision support systems won’t replace common sense.” He challenged the largely academic audience to look toward the future of agriculture with a “focus on continuing to improve our understanding of the PA system and package that understanding to be implemented [on the farm].” He mentioned several key components to achieving this goal including:

- Data sharing
- IP neutral relationships
- Demonstration farms
- Focus on all pillars of sustainability (economic, environmental, and social)
- Balance between basic and applied research

In closing, Dr. Sudduth emphasized the importance of bringing together the public sector, researchers, agronomists and other trusted advisors, equipment companies, and

non-traditional ag partners like data services and big technology to develop and foster the partnerships necessary for a successful future for agriculture. Precision agriculture is rapidly becoming “mainstream” and will play a greater and greater role in the crop production industry. Research will continue to be necessary and academic events like the ECPA are valuable for reporting new discoveries.

The next major academic PA conference will be the 14th International Conference on Precision Agriculture, June 24-27, 2018, in Montreal, Quebec, Canada (ispag.org). Another great opportunity for anyone involved in PA is the annual InfoAg Conference. InfoAg is the premier PA event focused on the critical connection between research and practice and will be next held 17-19 July 2018 in St. Louis, MO (infoag.org). 🌐

For more information, contact Dr. Steve Phillips, Director, IPNI, 3118 Rocky Meadows Rd., Owens Cross Roads, AL 35763, Contact Steve at: sphillips@ipni.net.



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Daniel Jacobs

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Changing the Narrative: It's Not Just About Yield

For years now when someone outside the industry asks what I do, I give them the “elevator speech,” the 30-second recap that explains what our magazine, digital products, and events are designed to do. It goes something like this:

“By 2050, there will be 9 billion people on the planet. To feed all those people we will need to increase our food production by anywhere from 60% to 100%, depending on the estimate. Our magazine focuses on the products that can be used to help make that happen.”

Simple. Concise. And possibly wrong. Or, at least partially wrong, according to a new study, “Agriculture in 2050: Recalibrating Targets for Sustainable Intensification,” from a team of researchers from major American land-grant universities.

The mantra that the industry has shared for so many years comes from research that is several years old, and while it was not necessarily inaccurate at the time, it doesn’t account for advances made since the early 2000s. For example, since 2005, global cereal production has increased 24% and oil crops 39%, according to the authors of the study, which was published in *BioScience*.

course on the future of agriculture is dominated by an imbalanced narrative that calls for food production to increase dramatically — potentially doubling by 2050 — without specifying commensurate environmental goals.”

I will take issue with that last statement. The industry has done an admirable job of late focusing on the environmental issues around agriculture and the products used to increase yields. China has been inspecting factories for several years in an effort to improve the environmental footprint of that country’s manufacturers. In addition, the industry as a whole has embraced biological control products. *AgriBusiness Global*’s sold-out Biocontrols Africa conference in July is just one example. Sister publications have or will host three other biocontrol events this year.

The growth and focus on precision agriculture is another example of the dedication to improving yield, giving manufacturers and distributors new tools to improve the sustainability and efficiency of crop production systems.

A recent discussion at the AgriBusiness Global Trade Summit seemed to cast some doubt on one

“The future of agriculture is dominated by an imbalanced narrative that calls for food production to increase dramatically.”

Lead author of the study Mitch Hunter said the current data suggests a production increase of 25% to 70% would be necessary to meet the growing population’s needs. “The new research indicates that ‘roughly historical rates’ of production growth should be able to meet this lower demand.”

But researchers were concerned with more than just the rate of production. Food waste was one issue, but the study also looked at how the impact a singular focus on increased production could have on other areas of agriculture. In addition to increasing efficiency, the industry should concern itself with “nutrient losses, and greenhouse gas emissions from agriculture must drop dramatically to restore and maintain ecosystem functioning.”

According to the study, “The prevailing dis-

of the key components of the original argument. It seems there are those who believe the 9 billion figure is inaccurate. Not only will we not reach 9 billion people by 2050, we might actually drop below the current level of 7.5 billion currently walking the earth.

Wherever we end up, I have confidence the ag industry will respond to the needs of growers and *AgriBusiness Global* will be providing the insight companies need to make the decisions to keep their operations relevant. 🌐

Where in the World

Eric Davis and Rebecca Bartels will visit Jakarta,, Indonesia in September.. Dan Jacobs will be in Basel, Switzerland in October.





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福华通达农药科技有限公司

FUHUA TONGDA AGRO-CHEMICAL TECHNOLOGY CO.,LTD.

Sichuan Leshan Fuhua Tongda Agro-Chemical Technology Co. Ltd, specializes in glyphosate and glufosinate manufacturing, with current annual Glyphosate 95% Tech production capacity of 120,000Mt(glycine route) and Glufosinate 95%Tech capacity of 10,000Mt. It is the largest producer in China and the second largest world-wide. Fuhua is projecting Dicamba and 2,4-D in capacity of 5,000Mt/a each in the next two years by fully utilizing the advantages of its integrated industrial production chain involving phosphorus, brine, glyphosate and silicone, making it to be the most competitive agro-chemical products producer in the field. The factory is located in Leshan city, Sichuan Province, an area with extensive resources for Agro-chemicals manufacturing, and the international sales offices are located in Shanghai and Singapore. Fuhua exports to America, Asia, Africa, Oceania and Europe, with over 2500 employees around the world.



SUSTAINABLE SUPPLY OF HIGH QUALITY AGROCHEMICALS

- | | | | |
|-----------------------|-----------------------|---------------------------|------------------------------|
| • GLYPHOSATE 95% TECH | • CYPROCONAZOLE | • PROPICONAZOLE | • GLYCINE (INDUSTRIAL GRADE) |
| • GLUFOSINATE 95%TECH | • DICAMBA | • S-METOLACHLOR | • GLYCINE (FOOD GRADE) |
| • ACEPHATE | • DIFENOCONAZOLE | • TEBUCONAZOLE | • PARAFORMALDEHYDE |
| • ACETAMIPRID | • FENVALERATE | • THIAMETHOXAM | • MELAMINE 99.8% |
| • ATRAZINE | • FLUROXYPYR | • THIOPHANATE-METHYL | • METHIONINE |
| • AZOXYSTROBIN | • IMIDACLOPRID | • TRICYCLAZOLE | • HEXAMINE |
| • BENTAZONE | • MESOTRIONE | • CAUSTIC SODA FLAKES | • SODA ASH |
| • BISULTAP | • METRIBUZIN | • CAUSTIC SODA PEARLS | • AMMONIUM CHLORIDE |
| • CHLORPYRIFOS | • MONOSULTAP | / SOLIDS | • TRIPLE SUPERPHOSPHATE |
| • CLETHODIM | • OMETHOATE | • SODIUM TRIPOLYPHOSPHATE | • DAP、NPK |
| • CYHALOFOP-BUTYL | • PARAQUAT DICHLORIDE | (STPP) | • MAP、UREA |

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