# Speciality Chemicals Magazine

APRIL 2009
Volume 29 No. 03

# Progress without screening

**Peter Blezard**, CEO of **Plant Impact**, showcases a new approach to agrochemical and nutritional development

Agrochemicals suppliers are under growing pressure. Farmers are demanding more at a time when the agrochemicals industry is struggling to develop new products due to higher costs. Environmental and demographic pressures are part of the problem. The rising world population means that farmers need to deliver higher yields.

However, they must do so against a backdrop of accelerating environmental change, including extreme weather conditions and an increased risk of drought, all of which makes delivering reliable yields increasingly difficult. In addition, farmers are expected to grow crops sustainably, without degrading the environment and lowering future yields.

Farmers therefore expect their agrochemicals supplier to provide them with products that can deliver larger, more reliable yields without harming the environment. Unfortunately, traditional agrochemicals businesses are having problems too. Rising oil prices have forced up the cost of products that include hydrocarbon-derived ingredients.

The cost of product development has also been rising; it can cost around €100 million and take ten years to bring a new product to market. As a result, the agrochemicals market has stagnated. It is increasingly dominated by traditional products produced by ever fewer companies: six in 2008, compared to 12 in 1994.

## A new approach

The rising cost of product development is partly due to the techniques traditionally used. Molecules are screened to find those which would make good insecticides or fungicides. The problem is that, as more active ingredients are identified, the number of molecules that must be screened to discover a new product candidate has also risen. This, in turn, has made the development process longer and more arduous.

Plant Impact is among the companies seeking new approaches to agrochemical development. It looks for an unmet market need by offering answers to long-standing problems instead of starting product development by screening molecules.

This approach, we believe, focuses and speeds up the development process. Thus it means that the final product is tailored to the needs of the grower or farmer. In particular, the product is developed to meet stringent environmental standards and to be safe and cost-effective, while delivering reliably higher yields.

Pesticide development is a good example of where this approach can be used. There is a growing demand for pesticides that are safe for the environment, the farmer and the consumer. However, completely safe pesticides are very rare.

Plant Impact decided to develop a product to meet this need. By deciding what parameters the product should meet before development began, the search for active ingredients could focus on food-grade materials already present in the human food chain.

Further development of the product needed only to focus on ensuring that it was effective against the world's most prevalent pests, such as whiteflies, aphids, mites and thrips. The product, BugOil, is a new benign pesticide and repellent that has no effect on organisms higher in the food chain than the target pests (see also *SCM*, November 2005, pages 20-21).

## Focused fertilisation

Calcium and nitrogen are critical to the healthy growth of plants; calcium and nitrogen fertilisers are, therefore, essential to increase crop yields. In addition, plants containing ample calcium are more nutritious. However, traditional fertilisers rely on applying large amounts of the nutrient to the plant. This is wasteful and can be damaging to both the crop and the environment.

**Cucumber with resilient PiNT habit** (left) **& weaker nitrate growth habit** (right)

Nitrogen is usually applied to plants as ammonium or amine, which helps promote healthy branching of the top growth and roots. This is desirable in most yielding crops.

Unfortunately, conventional nitrogen fertilisers tend to break down into nitrates, which are less useful to the plant and encourage long stems and weak, gangly growth. They are also readily leached through soil and can contaminate waterways and groundwater, especially if excess fertiliser has been applied. Recent events show that the overuse of nitrogen fertiliser is expensive when oil and gas prices rise.

Excess calcium, meanwhile, fails to stay where it is needed in the plant. It therefore fails to tackle calcium imbalances that develop in plants during the growing season.

The distribution of calcium changes as a plant matures, because plants do not grow at the same rate throughout development and each part experiences environmental stresses differently. This is a particular problem when plants are under high stress, such as under conditions of drought or excess rainfall.

Beginning the development process by problem solving rather than screening compounds can help here too. Plant Impact, for example, has developed two fertilisers to deliver calcium and nitrogen more efficiently, called CaT and PiNT.

The starting point for designing these fertilisers was existing scientific knowledge of how plants take up and transport nutrients. Both CaT and PiNT rely on this knowledge to deliver nutrients in a targeted way.

## PiNT & CaT

PiNT is a controlled uptake fertiliser consisting of urea bound into an organic acid cation complex with an essential metal nutrient. The complex can include essential metal nutrients such as calcium, magnesium and potassium, depending on what response is required from the plant.

PiNT stabilises amine and ammonium molecules, reducing the rate at which they break down into nitrates. This means that nitrogen can be taken up by the plant in its most useful form and is available in the soil for a longer period. Since PiNT reduces nitrate production, it also minimises leaching into the soil and potential water pollution.

Meanwhile, CaT (see also *SCM*, April 2007, pages 20-22) uses a plant's own cellular calcium pump to move calcium to places that have reduced availability of the nutrient. It does this by using a food-grade extract that mimics the presence of auxin non-hormonally.

CaT is then partnered with a calcium molecule and the nutrient is then pushed from cell to cell. The speed at which calcium can move through the plant using this method is 20-50 times more effective than using conventional treatments.

**Apples after three applications of 1.5 litres of InCa fertiliser**

Conditions caused by calcium deficiencies or crops being under heat, cold or drought stress, such as bitter pit, cracking, black tip, blossom end rot and hollow heart, can be overcome using CaT. The result is better quality, higher-yielding produce.

In US field trials on Honeycrisp apple trees, Pi's CaT InCa fertiliser used eight times less calcium than standard calcium treatments, improved calcium levels in the fruit two-fold and controlled bitter pit. In addition, the apples could be harvested ten days earlier than usual and retained their integral firmness at far higher levels than normal for over 90 days

Field trials have also been carried out in Spain using both PiNT and CaT on tomatoes. A recent study in Almeria found that marketable tomato yield when PiNT and CaT was used increased by 36-48% compared to standard grower practice. The incidence of blossom end rot, a fruit rot in tomatoes created by cellular collapse due to a lack of calcium, decreased from 30% to 8%.

A study of PiNT and CaT on Iceberg lettuce in the Netherlands found that the incidence of tip burn, a disorder caused by calcium deficiencies arising from high temperatures, low humidity and other factors such as salinity and a lack of water, decreased to nil when these fertilisers were used. After the lettuces had been stored for four weeks at an ambient temperature, more than 80% of the treated lettuce hearts remained in a 'good' and supermarket-standard condition compared to 0-20% of the control group

## Conclusion

Agrochemicals suppliers have found themselves caught between the growing demands placed on farmers and their own declining ability to meet these needs. Inefficient traditional approaches to agrochemical development were part of the problem.

Pioneering companies are now adopting new approaches to product development that are specifically designed to meet a market need. The results are environmentally sound products that deliver higher, reliable crop yields with reduced input which still allow the grower or farmer to realise premium quality produce.

For further information, please contact:
Peter Blezard, CEO
Plant Impact Plc
12 South Preston Office Village
Cuerdan Way
Bamber Bridge
Preston, PR5 6BL
UK
Tel: +44 1772 628328
E-mail: peter@plantimpact.com
Website: www.plantimpact.com