

# SUGAR CANE

## Opportunity and innovation may secure an even brighter future for this crop

by Carol Phillips, Executive Consultant Communications and Media

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Spotlight On Series

### WHAT OUR CUSTOMERS SAY

#### Ultra Foliar on Sugarcane | Field Test in China

*"The cane's height and leaf mass is visually greater and the flowering appears bigger and in much greater numbers. Because the flowering is more advanced this should result in a better yield. Ultra Foliar applied to this crop has certainly made a difference".*



#### Ultra Foliar on Sugarcane | Field Test in China

*"The rich colour of the striation in the cane reflects a healthy plant and with more tiller development and thicker cane stem growth an excellent result is expected".*





## OVERVIEW

FAO of the United Nations documentation tells us that sugarcane (*Saccharum officinarum L.*) is a tropical, perennial grass that tillers at the base to produce multiple stems.

It grows three to four metres in height and approximately five centimetres in diameter. Its composition varies, depending upon many factors and these include the climate, soil type, irrigation, fertilisers, insects, disease control, varieties and the harvest period.

The 'millable' cane stalk, which accounts for approximately 75% of the entire plant contains 11-16% fibre, 12-16% soluble sugars, 2-3% non-sugars and 63-73% water. Although the average yield of the 'millable' cane is 60 tons per hectare per year, this figure can vary widely dependent upon the aforementioned factors, anywhere between 30 and 180 tons per hectare.

Sugarcane is an important cash and trading human food crop, but can also be used as a major feed source for most livestock. This is true for both small-holding farmers with just a few pigs and poultry stocks, or for large-scale animal production enterprises. It is also an important trading resource for sugar factories and mills who seek to diversify or value-add to the current cane by-product.

There are moves afoot to promote the use of the entire crop – to exploit its rich potential for raw sugar, animal feed and energy.

The perspective of sugarcane being a bankable resource only in terms of its 'millable' stem for sucrose (raw sugar) is fast losing traction. There is an emerging view that for far too long sugarcane has been under-recognised and under-utilised, and new markets for energy uses such as bioelectricity and biofuels are aggressively being explored. Sugarcane is reportedly one of the most efficient plants in using solar energy to convert carbon dioxide and water to carbohydrates, and is presently undergoing a 'user-friendly' metamorphosis with regard to its potential both as an industrial raw material and for feeding all kinds of livestock (i.e. not only for pigs).

The possibilities for sugarcane are brought into much sharper focus when it is considered that worldwide only 20 countries produce oil for energy, yet over 100 countries cultivate sugarcane.

Opportunity and innovation can drive this change towards a future when today's sugarcane by-product – the 25% considered 'unmillable' – can be harnessed as supplementary feed for livestock OR for producing power and energy.



## WORLDWIDE PRODUCTION

The following chart establishes the world's top 10 producers of sugar cane.

It also charts an upwards trend for most countries, (with only India and Colombia showing declining production over the statistics for the given period). Indonesia continues its climb, and over the three year period moved to a rank higher than The Philippines. This trend to higher production figures is expected to grow.

Country (by ranking)	2012 (by million tonnes)	2015 (by million tonnes)
Brazil	721.07	739.26
India	347.87	341.2
China	123.46	235.53
Thailand	96.5	100.09
Pakistan	58.39	63.75
Mexico	50.94	61.18
Colombia	38	34.87
Philippines	30	31.87
USA	27.9	27.9
Indonesia	26.34	33.7

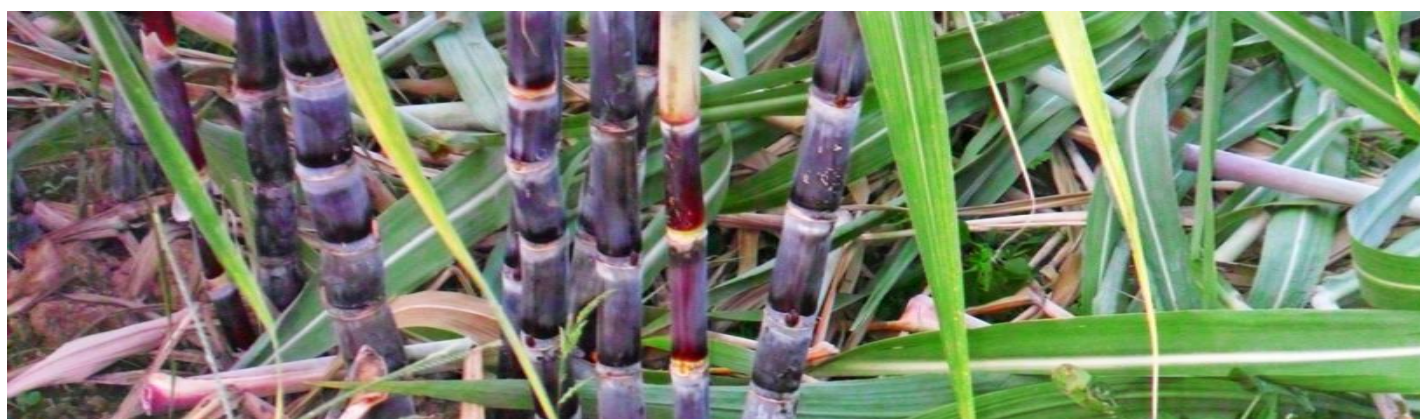
Australia's production statistics by comparison are quite low, with around 4.5 million tonnes of raw sugar being produced annually. Although this production level still places Australia just outside of the top 10 ranked countries in about 11th or 12th position.

However as an exporter of raw sugar Australia is in the top 5 countries worldwide behind Brazil and Thailand. And exports are forecast to move even higher as recent trade agreements have increased access to markets such as South Korea.

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**Australia is a leader in sugar exports worldwide**

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## IN AUSTRALIA

The Australian sugar industry produces raw and refined sugar from sugar cane.

Around 95% of sugar produced in Australia is grown in Queensland with about 5% in northern New South Wales, along 2,100 km of coastline between Mossman in far north Queensland and Grafton in northern New South Wales. A sugar industry was established in Western Australia in the Ord River Irrigation Area in the mid 1990s but ceased operations in 2007.

The Australian sugar cane industry is one of Australia's largest and most important rural industries with sugar cane being Queensland's largest agricultural crop.

Up to 35 million tonnes of sugar cane is grown on about 380,000 hectares of coastal land annually. This sugar cane crop can produce up to 4.5 million tonnes of raw sugar, 1 million tonnes of molasses and 10 million tonnes of bagasse (*the fibrous matter that remains after sugar cane stalks are crushed to extract their juice that is then utilised as a biofuel or in the manufacture of pulp products*) annually.



### Facts & Figures about Location and Operations

The Australian sugar cane industry is located mainly along Australia's eastern coastline, from Mossman in far north Queensland to Grafton in northern New South Wales.

There are approximately 4,400 cane farming entities growing sugar cane on a total of 380,000 hectares annually.

They supply 24 mills, owned by 7 separate milling companies.

The vast majority of cane farms are owned by sole proprietors or family partnerships with the mill ownership structures being a combination of publicly owned entities, privately held companies limited by guarantee, and co-operatives.

Acknowledgement : [canegrowers.com.au](http://canegrowers.com.au)

## THE EXPORT MARKET

The industry's major product is raw crystal sugar, which is sold to refineries both domestically and abroad.

Approximately 95% of Australian sugar produced comes from Queensland with the balance from Northern New South Wales. Approximately 85% of the raw sugar produced in Queensland is exported, generating up to \$2.0 billion in export earnings for Queensland. Production from the New South Wales sugar industry is refined and sold into the domestic market.

Still amongst the most efficient sugar cane and raw sugar producers in the world, Australia pioneered the development of the mechanised cane harvester.

Australia maintains its export competitiveness by continuing to adopt innovative and efficient practices, particularly through mechanisation, modern farming fertiliser routines, new farming techniques and diversification.

There is a bright future for sugar cane in Australia, as many of the challenges associated with highly-distorted world trade markets as well as widely variable climate factors are being overcome.

The Australian sugar cane industry has undergone significant rationalisation in the production and processing sectors over the past decade. This rationalisation has seen changes in terms of mill ownership and structures to promote greater cohesion and efficiency of operations – and it is expected that this will continue. The sugar industry directly employs about 16,000 people across the growing, harvesting, milling and transport sectors.

## Queensland generates \$2bn in export earnings every year



## GREEN ENERGY FUTURE

Sugar mills are self-sufficient in energy, burning the sugar processing by-product bagasse to generate electricity and steam for factory operations. In addition, more than half of the electricity generated is exported to the electricity network supporting electricity infrastructure and reducing greenhouse gas emissions from power generation. The use of renewable bagasse for the production of 'green' energy reduces the nation's greenhouse gas emissions by over 1.5 million tonnes annually.

This is a strong, optimistic indicator for the industry.

The following stories highlight this level of innovation and optimism for sugarcane.

## EXAMPLES OF INNOVATION AROUND SUGARCANE

Here are just four examples of the innovative practices for, and uses of, sugarcane. Synopsis and links to the original articles follows :

### 1. 'sugar transformed into flour'

In a world first, Australian sugar cane is being made into a new gluten-free, low-sugar, high-fibre flour substitute. The breakthrough technology was developed by an Australian company at Ayr, near Townsville in Queensland, after five years of research and millions of dollars of investment. The cane flour, known as Kfibre or Fibacel, is made from crushed cane stalks with the sugar juice removed to produce a pale-coloured powder. It is being sold as a natural substitute for wheat flour to consumers suffering from gluten or starch intolerance, grain allergies and celiac disease. This is an excellent value-add, given that the sugar price is at a near-record level already.

Read more of the article at the link given.

<http://ausfoodnews.com.au/2011/11/02/new-australian-innovation-sugar-transformed-into-flour-substitute.html>



### 2. 'sugar's future in renewable energy'

At the Sugar Cane Technologists Conference held in April 2016 the potential partnerships between the Australian sugar industry and the bio-energy sector was a hot topic. Moving from one presentation to another, the words on everyone's lips were "renewable energy" and just how the sugar industry can play a role in its development. A spokesperson said, *"What we are doing is finding a way to replace diesel fuels for use back in the sugar industry"* and also that *"The particular work we're doing at the moment is actually producing biomethane from sugarcane residues and using that biomethane in diesel engines in farm machinery or locomotives."*

Read more of the article at the link given.

<http://www.abc.net.au/news/2016-04-29/experts-say-the-future-of-sugar-industry-is-in-renewable-energy/7367418>





### 3. 'sugarcane growers consider the use of drones'

The sugarcane industry could be next on the list to utilise drones for improved farm production. ABC Rural recently reported that the potential of the technology was exciting. It may be early days but a handful of growers who are trialling drones have reported that the initial results were promising. One of the things they are using them for is looking at how well the plants are going and whether the plants are healthy or if they are under stress.

Read more of the article at the link given.

<http://www.abc.net.au/news/2016-05-02/queensland-canegrowers-considers-drone-potential/7376492>



### 4. 'sugarcane and yeast processing'

An Australian company specialising in biofuels and yeast products says it is considering building a new processing plant in Queensland. The company has begun preliminary planning and studies on the proposal and intends to use sugar and oilseeds, all sourced from local growers. The sugar plant will produce yeast for livestock feed, and oilseeds will also be processed to make glycerine. A company spokesperson said that the company had considered locations across Australia and in south-east Asia, but Mackay in Queensland was chosen.

Read more of the article at the link given.

<http://www.abc.net.au/news/2016-04-27/plans-for-yeast-processing-plant-in-mackay/7361932>







## IN THE ASIA REGION

The importance of sugar to world markets has already been established and as can be seen from the rankings of the world biggest producers, the Asia region features prominently.

Six of the top 10 producing countries are Asian countries. Sugar cane has widespread implications for the earnings and well being of farm communities within the Asia region, as well as for consumers worldwide of this important food item.

- Of the nearly 180 million tonnes of sugar produced globally in 2015 (with 80% of this figure coming from sugar cane, 20% from sugar beets), nearly half was produced in the Asia region, with the major producing countries being India, Thailand and China.
- In terms of trade, the region accounted for nearly half of global exports and imports – with Australia, Thailand and India being the biggest exporters – and China, Indonesia and South Korea being the biggest importers of the product.





## OUTLOOKS FOR SUGAR DEMAND

The following chart details some of the expected outcomes for several sugar cane producing countries in the Asia region. This highlights the potential for sugar cane to become an even greater commodity on global markets.

Country	Outlook
China	China continues to be a net importer of sugar. Its domestic supply is simply insufficient to meet the increasing demand of its population. Self-sufficiency is not expected to be achieved, and imports will continue to increase. Increased competition from other crop types is expected to reduce the number of enterprises in sugar cane production in some traditional growing regions. Competing challenges and more attractive procurement prices for grain crops may dampen the enthusiasm for the crop and it is for this reason that the domestic industry is not expected to keep pace with the growth in domestic consumption. The population expansion rate is also likely to continue. As there has also been significant income growth over the last decade, this is expected to impact the consumption rate as well and will most likely increase consumer demand for sugar-based processed foods, beverages, snacks, desserts and the like.
India	Although Gur and Khandsari ( <i>a type of unrefined raw white sugar made from thickened sugar cane syrup. It is full of minerals and other nutrients, making it a healthier choice than refined, chemically treated sugar</i> ) are still the main sugar products consumed in rural areas, demand for white sugar is expected to grow in both absolute and per capita terms. Rising incomes and increasing urbanisation are expected to result in further shifts in demand to a more highly-refined product. Moreover, the growth of sugar demand by food industries and other non-household users, estimated to account for about 40 percent of total utilisation, will provide additional impetus to longer term market growth. Assuming that pricing and distribution policies remain unchanged, the domestic market could absorb much of the increase in production. Net imports could however be needed from time to time to offset crop shortfalls. However, as the Indian economy develops there may be potential for added incentives to expand production.
Japan	Japan's sugar consumption is projected to decline along with declining population.
Thailand	According to international sugar production cost statistics, Thailand ranks as one of the world's lowest cost producers. Efforts to expand cane production to better match milling capacity could enhance this status even further, however Thailand's future as a low-cost producer is not altogether certain in view of sharply increasing land costs (reflecting the rapid industrialisation of the country) together with rising labour costs (reflecting urbanisation and the aspirational movement of the population). Whilst domestic demand will continue to grow, it will still only be around 30% of annual output.
Indonesia	A major challenge for Indonesia is the extent to which domestic production can be expanded. Despite the dynamic growth in output in the decades since the 1980's, production figures in more recent years appears to have stabilised. This is reflective of constraints associated with both agricultural and industry sectors. Competition for land, particularly irrigated areas, from other crops and livestock production and increasing urbanisation in the densely populated areas of Java (in particular), has resulted in a shift in the cultivation of sugarcane to non-irrigated, more marginal land. The long-term viability of the industry will depend on improved agricultural and industry productivity as Indonesia becomes increasingly integrated into the world market and exposed to free market forces.
Malaysia	In the foreseeable future Malaysia will continue to import increasing quantities of sugar. Political policy encourages improved productivity in existing growing, milling and production areas. The industry is currently supported by the government with sugar import quotas and relatively high domestic retail prices. According to the National Agriculture Policy plan however, more research and development efforts are to be channelled into the development of alternative sources for sugar. As for the refining industry, unless refining capacity is expanded, a greater share of domestically processed refined sugar will be retained in Malaysia and less will be available for export.
Pakistan	Pakistan will likely continue to reduce sugar imports in accordance with its long-stated self-sufficiency goals. But, with good alternative crops and clear limits on irrigation water, self-sufficiency for Pakistan in any one commodity, such as sugar, will probably come at the price of foregoing production of other crop types. Improved efficiency will be required to create the basis for a competitive industry.
Philippines	In the Philippines, production has difficulty in keeping pace with consumption. The need is recognised by the government for expansion in both area and productivity. However, several factors stand in the way of this target and these include the need to improve research and development, support for small-scale growers and land reform to make the transition from small individual enterprise to estate farming so as the issues of economies of scale can be addressed. However as with many Asian countries the pressures associated with increasing urbanisation is having an effect on available land for growing sugarcane. Further policy reform is also required for the way in which the cost sharing system between, growers, mills and refineries operates.
Vietnam	The development of the sugar industry in Vietnam is one of the most dynamic developments occurring in the Asia region. The sugar industry is on a path of fundamental change, fostered by government policy towards expansion and self-sufficiency. Constraints to be overcome include lack of infrastructure, particularly transportation. While movement of sugarcane by water can help to minimise this issue, especially in the Mekong River Delta, deficiencies in the rural road system continue to raise constraints. Areas earmarked for sugar production expansion may be hampered by the availability of labour however the role for trade in this commodity in Vietnam whilst complex, is expected to grow.

## RLF PRODUCTS ESPECIALLY FOR SUGARCANE

### Nutrient Charger

RLF research and evaluation trials – as well as farmer experience over the past 20 years – has initiated and advanced the formulation of products explicitly designed for treating cane billets.

There are two products :



Nutrient Charger

#### Cane-Dip



#### Unidip



Both of these products are used in major sugarcane plantations worldwide.

They result in rapid cane strike bearing healthy root and shoot structure.

**Cane-Dip** has been developed to be the more economical of the two products as it is diluted more so than **UniDip** prior to treatment.

The nutrient charging of billets is best facilitated with prolonged soaking – generally longer than an hour, even up to a full day. The broad-spectrum nature of the essential elements in both of these products are present in a pH close to that of living cells. During treatment, these nutrients are loaded into cane tissue, filling the cellular and intercellular spaces of the billets with phosphorus, nitrogen, potassium and other essential major and minor elements.

It is this boosting of essential nutrients that nourishes and generates healthy root and shoot from the sugarcane billets.



By using a billet charger the plant is provided with early growth development and future yield potential. And by providing the nutrient to the plant at this time, and by this method, gives it increased early vigour and root development which stimulates the growth crop cycle to greater yield, quality and value.



The clear advantages of both RLF nutrient chargers are :

- Tissue air spaces are replaced with essential nutrients, which in turn increases the power to generate better root and shoot development.
- Transformation from bud to the new growth takes place much faster when the nutrient demands of growing tissue are satisfied.
- Stronger and healthier new growth forms because nutrient balance is achieved before roots become functional.
- Reduced dependence on soil-based nutrients during the early stages of the establishment and growth phase.
- Increased success rate because of this rapid growth (or charging) that reduces the pressure from disease and other adverse conditions.

**Cane-Dip** and **Unidip** have been specially engineered for the sugarcane industry.

Both of these superior crop nutrition products developed by RLF give protection for the delicate transplant period because they are a complete nutritional feeding program.

They offer a perfect replacement for any alternate fertiliser feeding program during this period of sugarcane establishment.

### Foliar Spray

The foliar products most widely recommended by RLF for sugarcane are **Cane King** and **Plasma Power**. Although a specific foliar product is currently being formulated, (but not yet ready for the market), especially for sugarcane as part of RLF's new product line – **KING Fertiliser**.



Ultra Foliar

#### Cane King



#### Plasma Power



**Plasma Power** is more suited to neutral to alkaline soils (above pH 6), since it contains a higher level of metallic trace elements. However, either of these products can be chosen for first or second foliar spray to suit the trace element need of the crop.

Soil nutrient variability and deficiency is fixed by foliar spraying the sugarcane crop. It gives increased growth and improved crop yield as well as many other economic and protective benefits.

The clear advantages of both RLF foliar products are that they :

- Safely transfer nutrients via the nutrient delivery system (NDS) that transfers its load of 12 optimally balanced nutrients directly through the leaf.
- Increase yield as independent trials in Australia have consistently demonstrated.
- Reduce granular NPK costs when used as part of an integrated fertiliser program.
- Are based on plant nutrient removal science.
- Solve soil variability problems as it bypasses the micro-nutrient requirements from the soil, instead delivering them through the leaf.
- Improve NPK uptake through increased agronomic uptake of NPK fertilisers by improving NPK mobility, resulting in greater fertiliser effectiveness and less toxicity.
- Handle environmental conditions better because it gives the plant more energy to deal with environmental stresses associated with inadequate rainfall, changing weather patterns, variations in soil, pests and other external conditions.
- Deliver higher yields and better quality and value with consistent crop results.
- Buffer the effects of herbicides, fungicides and pesticides as it provides a substantial boost of nutrition, as needed, to buffer against the toxic effects of chemicals.
- Invest greater strength to the plant enabling it to resist infection and disease.



### A Significant Secondary Benefit

Foliar spraying the sugarcane crop with either **K-Komplex** or **Plasma Power** gives a healthy return for the future as a very significant secondary benefit.

Building organic matter in cropping soils is achieved through the enrichment of the crop waste and root mass. RLF Broad-spectrum foliar products deliver a root mass and necrotic plant matter that has greater size and volume. This means that it returns more matter to the soil – and this is good news for the future – because at harvest time the plant returns all the nutrient contained in the root mass to the soil. Foliar spraying helps achieve all of this and more because larger volume plants, larger root structure and mass, higher nutrient values all add up to a healthy return for the future in both natural soil fertility and economic terms.

These are excellent products.



## RLF TECHNICAL ADVICE FOR GROWING SUGARCANE

### Nutrient Charger

Growers often treat cane billets with fungicides or insecticides. Both **Cane-Dip** and **UniDip** can be mixed with crop protection chemicals to treat cane billets for one single and efficient operation. If the contact or soaking time is less than an hour, or if billets are sprayed at planting, a more concentrated solution of product should be used for best result.



Nutrient Charger

This is explained in the following table :

Soaking / treatment duration	Dilution of Cane-Dip	Dilution of UniDip
Short contact-time, such as treating in a tank fixed on a planter or when spraying onto billets at planting.	1L to 50L of water	1L to 10L of water
Long contact-time by soaking for few hours or more.	1L to 100L of water	1L to 20L of water

When mixing either **Cane-Dip** or **UniDip** with other chemicals, first add the bulk of water in the tank followed by the required amount of product, agitate and then add the fungicide or other chemicals. Finally add water to make up to the target volume. A jar test is always recommended to ensure that products do not react when mixed. And it is always sensible to record and follow the order of mixing, and to use the same ratios as for your jar test when preparing the main mix.

### Foliar Spray

As sugarcane is a tropical/subtropical crop that grows in a variety of soils and pH, it is considered at its best when it grows in a pH range of 6 to 7. However the crop can grow in the pH range of less than 5, to over 8.



Ultra Foliar

The growing season ranges from many months to over a year. After harvest, the crop is regrown for a few more years as ratoon crop before replanting.

Sugarcane yield in Australia varies from 70 tonnes to 120 tonnes of millable cane per hectare, with each tonne removing approximately 1 kg of nitrogen, 0.2 kg of phosphorus and 1.5 kg of potassium from the soil. Crop removal for magnesium, calcium and sulphur is also considerable and in the range of 0.3kg per tonne. As expected, the trace element removal is also considerable and requires specific maintenance and care to get the best performance from the crop.



We are told in the Australian Sugarcane Nutrition Manual (page 5) that “Cane and sugar yields will be reduced if any of the 16 essential nutrients are in short supply, even though there may be ample supplies of all the others”. In a 100 tonne per hectare yield, the removal of trace elements is in the order of 3kg for iron, 1kg for manganese, 0.5kg for zinc, 0.2kg for copper and boron and 1 gram for molybdenum.

- In alkaline soils, that availability of metallic trace elements is low, and foliar application of nutrient is considered essential to achieve high yield.
- In acid soils it is important that adequate soil levels are maintained, and that foliar spraying is budgeted for to prevent trace element deficiency that can appear transiently due to drought, water-logging or root failure accessing soil reserves.

For application, a total of 10-litres per hectare of foliar product is recommended in split applications of 5-litres each in a minimum of 200–250-litres of water per hectare.

The most effective method is to first dissolve the Urea you have saved for foliar spraying in the tank at a rate of 10kg of Urea for each 200–250 litres of water, then add **K-Komplex** or **Plasma Power** at 5 litres per hectare. In the absence of Urea, 5-litres of NutriCover or RLF Power N sources can be used.

## CONCLUSION

Opportunity and innovation can drive a fundamental change for sugarcane as it seeks to harness the benefits of the entire crop. The days appear to be numbered when farmers think only of sugarcane in terms of 'millable' and 'unmillable' divides. This attitudinal change alone should see life breathed back into this important cropping industry.

Sugarcane is an important cash and trading human food crop.

But it is also an important feed crop for animal producers.

Likewise the benefits that it can deliver for the delivery of energy and fuel services is encouraging.

The moves afoot to promote the use of the entire crop – to exploit its rich potential for raw sugar, animal feed and energy – is being more readily embraced by the industry. For far too long sugarcane has been under-recognised and under-utilised, but now new markets for energy uses such as bioelectricity and biofuels are emerging.

The possibilities for sugarcane are positive and seemingly boundless.

RLF is at the forefront of crop nutrition for sugarcane. Its highly-specialised products give enormous advantage to sugarcane growers as increased yield and healthier crops are delivered at harvest.

For more information visit [www.ruralliquidfertilisers.com](http://www.ruralliquidfertilisers.com).

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