

# SCHOOLS PACK



#### AUSTRALIAN SUGARCANE

Cane growing and sugar production has been around for hundreds of years in Australia. It's been a catalyst for the development of many coastal communities and underpins the economic stability of many rural townships to this day.

It is the social fabric that has woven itself through the development of townships up and down the coast.

Sugarcane growers manage some of Australia's most unique vegetation, animal life, waterways and have the Great Barrier Reef in their backyard. Things have really moved on from the hype some twenty years ago and growers have taken upon themselves the mantle of farming responsibly - to protect the natural resources, their children's heritage, and of course, the value of their property and the Great Barrier Reef.









## **ABOUT SUGARCANE**

#### What is sugar made from?

Sugar is made from the juice of a giant tropical grass called sugarcane. Sugarcane itself looks like bamboo stalks and it is in the stalks that the plant stores energy that it doesn't need straight away – rather like animals make fat. The sugar juice stored in the stalks is what gets converted into raw sugar. People like sugar for its sweetness and the energy it provides, so farmers grow these plants commercially to extract the sugar.

#### Where is it grown?

Most of Australia's sugarcane is grown along the coast of Queensland, and the rest is grown in northern New South Wales and the Ord region in Western Australia.

#### How is sugar grown?

Sugarcane needs strong sunlight, fertile soil and lots of water (at least 1.5 metres of rain each year or access to irrigation) to grow.

Sugar is made in the leaves of the sugarcane plant by a natural process called photosynthesis and is stored as sweet juice in its stalks.

## PADDOCK TO PLATE...

#### Planting

Sugarcane is grown by replanting part of a mature cane stalk. Farmers cut some of the fully grown cane stalks into lengths of about 40 centimeters called "setts". The setts are planted by special machines, which drop them into furrows, add fertiliser and cover them with soil.

#### Growing

After a few weeks new shoots grow from buds on the joints of the setts and break through the surface of the soil. Up to 12 stalks grow from each sett, forming what is known as the stool of sugarcane.

A crop of cane takes about 9-16 months to grow in Queensland. In northern New South Wales (where it is cooler) it takes 18-24 months to grow.

Typically, a cropping cycle comprises one plant crop and 3-4 ratoon (regrowth) crops. When ripe, the cane is usually about 2-4 metres tall.

#### Harvesting

Australia's sugarcane is harvested during the drier months in tropical climates – between June and December each year - depending on the weather.

All sugarcane in Australia is harvested mechanically - in fact Australia was the first sugar producing nation to convert entirely to mechanical cane harvesting back in 1972.

The cane harvester drives along each row and cuts the cane stalk off at the bottom of the plant. The long stalk is then cut into many shorter lengths called 'billets' (around 30cm). Another machine known as a cane haulout drives alongside the harvester, collecting all the billets.

Originally all the cane was cut by hand. Thousands of workers harvested the crop by hand using large knives. It was hard work.

Although experimental machines began cutting cane as early as the 1920s, it was not until after World War II as capable hand cutters became increasingly difficult to obtain for the expanding harvest, that mechanisation really took off. The industry continued to depend heavily on manual cutters until well into the mid-1960s

New technology is making the harvesting process more efficient. Fewer machines now cut larger tonnages, continuous crushing is being used in most areas and cutting outside of usual daytime hours has been adopted.





a haulot which drives alongside







The sugarcane industry used to be synonomous with cane fires. Why did farmers use fire? Until the 1940s most cane was cut green by hand cutters with residual trash burnt on the ground. Burning became standard practice due to outbreaks of the potentially fatal Weil's disease (carried by rats living in the cane), labour shortages and the ability of manual cutters to cut and load burnt cane faster than unburnt cane.

Nowadays, new techology is making it possible for cane growers to not have to burn - and it's better for their paddocks and their bottom line (profits). Over 80% of Australia's cane growers use a thick mulch, similar to that which is used by gardeners. They call it a 'green cane trash blanket'. When the grower harvests the unburnt cane, the trash is left in the paddock where it acts as a protective blanket for the soil, preventing soil erosion, assisting in weed control, improving soil structure and conserving moisture in the soil. This reduces the need for soil cultivation which also helps minimise soil erosion. In some areas the different climate and soil types have meant these farmers have had to keep burning - they are waiting anxiously for technology which enables them to not burn as well.



#### Getting the cane to the mill (quick!)

Once sugarcane has been harvested, it must be transported to a sugar mill as soon as possible. The longer it takes, the more sugarcane juice stored in the stalks will evaporate - so it is important that it arrives within 16 hours of being cut, to minimise deterioration.

The cane haulout collects billets until its full, then drives across the paddock to the road, where it unloads its contents either into a semi truck (for road transport) or mill bins at local sidings on the nearest railway track (for train transport). The industry maintains a network of nearly 4000 km of narrow-gauge rail lines to get cane from the paddock to the mill quickly and cost effectively.

#### Turning sugarcane into 'raw' sugar at the mill

Australia has among the most efficient and technologically advanced sugar mills in the world. Australia has 25 mills located within the areas where sugarcane is grown. Most sugar mills were established more than a century ago. Sugar mills are large, self-contained factories which only operate during the harvesting and crushing season.

Sugar mills crush and wash the juice from cane stalks and separate as much sucrose as possible from the water, impurities, fibre and dirt that comprise the rest of the cane juice. How does it do this?

#### When the sugarcane first arrives

Computerised cane transport scheduling systems enable cane movements to be continually monitored. When the cane arrives at a mill it is weighed and processed at automatic cane-receiving stations. The weight of cane in each bin and the name of the producing farm are automatically recorded.

#### Turning sugarcane into 'raw sugar'

The billets (short pieces of canestalk) are tipped onto a cane carrier for transport to a shredder, which chops and shreds the cane into fibrous material and ruptures the juice cells.

It is then crushed by large rollers. Firstly, pairs of rollers feed the cane through a series of mills comprising three large rollers arranged in a triangular formation. This separates the juice from the fibrous material, which is called bagasse which is used as fuel to run the mill's boiler furnaces.

The juice is pumped away for processing into raw sugar. The extracted juice is then cleaned to remove impurities. The juice is thickened into a syrup by boiling off the excess water, seeded with raw sugar crystals in

#### By-products from mills are recycled, adding to the efficiency of the milling process.

Bagasse, the cane fibre remaining after the juice has been extracted, provides much of the fuel needed to power the mills.

Other by-products such as ash (boiler ash is "scrubbed" from the mill stacks) and filter mud (the residue left after the sugar has been cleaned) can be used as a fertiliser on cane farms and gardens.

Molasses is the dark syrup separated from raw sugar crystals during the milling process. It is used as a raw material for ethanol and rum. It can also be used for animal feed.

To remain competitive with the rest of the world, Australia is continually striving to improve the efficiency and productivity of its cane harvesting and transport practices. Particular goals are to improve cane and sugar yields through better harvest scheduling and by reducing cane and juice losses as cane passes through the harvester.

a vacuum pan and boiled until sugar crystals have formed and grown. The crystals are then tumble-dried and placed in large storage bins.

Australian mills produce 'raw' sugar, which then needs further refining become it becomes suitable for human consumption.

#### Storage & shipping overseas

Around 80% of Australia's production is exported overseas as 'raw' sugar, where it is further processed.

Raw sugar is stored at bulk sugar terminals before being sent to refineries. Queensland's bulk sugar terminals can store more than 2 million tonnes of raw sugar, allowing year-round deliveries to refineries in Australia and overseas. Queensland bulk sugar terminals are located at Cairns, Mourilyan, Lucinda, Townsville, Mackay, and Bundaberg.

Since 1964 all raw sugar in Australia has been handled and transported in bulk. Bulk sugar is transported from the mills in containers by either road or rail from the mills to the terminals, where it is carried by conveyor into the storage shed. When a ship arrives it is filled quickly with conveyors.

Australia is the world's second largest exporter of raw sugar after Brazil. We sell mainly to East Asia, China, Indonesia, Japan, Korea, Malaysia and New Zealand. Australia has an international reputation as a reliable producer of high quality sugar.

#### Sugar refining (from 'raw' sugar to ready to eat)

Raw sugar is an intermediate product, which requires further refining before it can be used for human consumption or as an ingredient in the manufacture of food and beverages.

At the refinery, the raw sugar crystals are washed and dissolved in hot water. Carbon dioxide and lime are added to the melted sugar to remove remaining impurities. The sugar is filtered through cloth, then the remaining colours and impurities are removed and the pure sugar is boiled in a vacuum pan and seeded with fine sugar crystals. When the crystals are large enough they are tumble dried to remove moisture. The dried sugar is then graded into sizes ready for delivery to customers.

Australian refineries process around 20% of Australia's raw sugar into white (refined) sugar and liquid sugar products and other speciality products such as Golden Syrup, treacle, coffee sugar and cube sugar.











## Sugar cane is grown in some of the most beautiful parts of Australia.

Cane growers are always looking at the latest technology to improving their farming practices to help reduce soil erosion and protect nearby waterways and the Great Barrier Reef.

Many farmers consider the reef to be their backyard as they go out fishing and on family days on the weekends. They want to protect the land and the reef so it is still in excellent condition for their children and their grandchildren to ejnoy for many generations to come.

### Sugar nutrition

Sugar plays an important role in providing the energy necessary for our bodies to function properly.

Sugar is a type of carbohydrate. Other carbohydrate-rich food includes breads, cereals, fruit, rice, potatoes, legumes and pastas. Carbohydrates are the body's preferred energy source.

During digestion, all sugar (and other carbohydrates) is broken down into simple sugar, glucose, which then travels through the blood stream to body cells. There it provides energy or is stored, as glycogen, in muscles or the liver for future use.

The key is to balance energy inputs (what we eat) with outputs (the energy we use) while recognising the importance of taste (treats we like) and nutrition (what's good for us).

Since sugar has half the calories of fat (1 teaspoon of sugar contains only 20 calories where as 1 teaspoon of fat contains 45 calories), gram for gram sugar is less fattening. In fact the most recent research indicates that people who eat moderate amounts of sugar are less likely to eat as much fat, and vice versa.

# energy in, energy out

