

Enjoying coffee's many pleasures

A world in the grip of coffee-fever

Coffee-drinking has reached cult status. The jet-black drink is becoming ever more popular around the world, and coffee beans are now the second most important traded commodity after crude oil. Creating the perfect coffee aroma doesn't just depend on having healthy coffee trees – the beans also need to be treated in the right way.

First they are pressed, and then soaked in water for hours on end. After that, they are left out in the sun for several weeks. Finally, they are transported in sacks, roasted in steel basins, cooled, and milled to a powder. Coffee beans have a long and arduous journey behind them before they are finally turned into the brew that revives sleepy people around the globe. And with the help of cappuccino, latte macchiato and espresso, the coffee bean has now achieved cult status. In the past, the traditional gurgling coffee machine would pass boiling-hot water through coffee in a filter; but nowadays, it's espresso machines that hiss and spit away with their coffee pad or capsule systems. Modern, fully-automated coffee machines are allowing more and more consumers to enjoy Italian coffee flair at home.

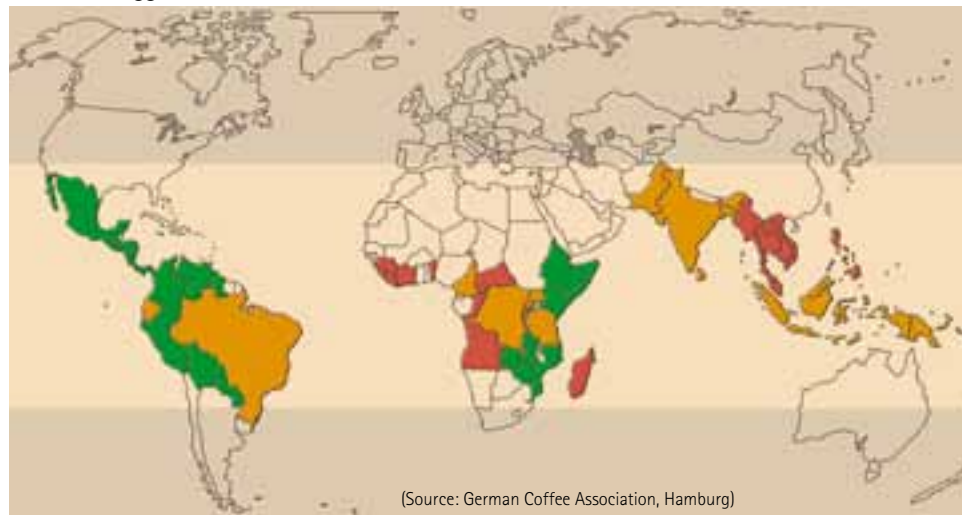
"Coffee used to be a precious commodity: the 'good' coffee would only be brought out to the table on special occasions. But nowadays, coffee is affordable for everyone", says Dr. Johannes Dengler, Member of the Board of Alois Dallmayr Kaffee OHG. Moreover, coffee shops with modern décor are giving the drink a young, dynamic image. It's the Scandinavians in





particular who love the aromatic pick-me-up. Take Finland for example: the average Finn uses 12 kilogrammes of raw coffee a year. The EU average is less than half of that – lying at around five kilogrammes per person. Coffee stimulates the senses. It is redolent of comfort and security, reminding us of large family celebrations. Or we associate it with the flair of relaxed afternoons spent in cafés. American psychologists argue that a cup of hot coffee even promotes sociability: people enjoying a warm drink tend to respond more warmheartedly than those holding an iced coffee in their hand. “For all that, coffee-drinking used to suffer from a reputation for being boring”, says Professor Dr. Alfred Gebert, Emeritus Professor of Psychology at the Federal University of Applied Administrative Sciences at Münster. “But these days, you will hear the fashionable phrase ‘coffee to go’ in cafes situated in even the most provincial of towns. This is, so to speak, a synonym for our present-day multi-tasking society. Just as we – and I mean men in particular – enjoy the business lunch, so ‘coffee to go’ is another contemporary document of our work-life mix”, thinks Gebert.

The Coffee belt



■ 100 % Robusta ■ 100 % Arabica ■ 100 % Robusta & Arabica

Global exports of raw coffee

(in millions of sacks at 60 kg each / 2007/08 coffee season)

Total	88.3		
Brazil	24.3	Peru	3.2
Vietnam	15.8	Honduras	3.4
Colombia	10.8	Uganda	3.2
Indonesia	5.1	Ethiopia	2.8
Guatemala	3.8	India	2.5

In Germany, coffee is actually the number one favourite drink: last year, the average German drank 148 litres of coffee; mineral and spa waters took second place with 138 litres, followed by beer at 110 litres per person. Even the financial crisis has not damaged the aromatic drink's popularity – the demand for coffee continues to defy the recession. Global demand for raw coffee has been rising continuously for years now, according to the German Coffee Association's "Coffee Compass 2009". In the coffee production year 2007/08, demand grew by a further two million sacks (at 60 Kilogramms each) over the previous year, to a total of 127.5 million sacks.

Coffee is „in“ these days - you see more and more people drinking coffee, at all times of the day and night.



A single coffee plant produces, on average, five kilograms of fruit per year. After processing, less than one kilogram of coffee remains.

Coffee experts agree that the most conspicuous recent trend in coffee consumption around the world has been the move towards a demand for higher quality. For about ten years now, coffee growers have had to take on the challenge of producing high-quality beans.

Increasing demand for higher quality

Although only two species of coffee tree are economically significant – *Coffea arabica* (or ‘Arabica’) and *Coffea canephora* (also known as ‘Robusta’) – there is still a great deal of variation in terms of quality. It’s not just the areas of cultivation that have their own typical quality characteristics. Even local geographical aspects have an influence, such as whether the plants are growing on the North- or South-facing slopes. Climatic conditions also determine the flavour of the fruits. One of the major determinants of the final product’s quality is whether or not the fruits (coffee berries) are all harvested at approximately the same stage of maturity: ripe berries are shiny red, whereas unripe ones are still green. And because the berries don’t always ripen evenly on the coffee tree, harvesting remains an arduous task that still needs to be done by hand in most areas of cultivation. The unripe berries have to be selected out, because they can ultimately spoil the taste of the coffee.

There are two particularly important natural enemies of the coffee plant that can throw the coffee berry ripening process out of equilibrium, and thus destroy entire harvests. “The most damaging parasitic species for coffee are the so-called coffee rust, a fungal disease, and the leaf miner, a type of



moth”, explains Gerhard Bohne, crop protection expert and coffee specialist for Bayer CropScience in Brazil. “Both cause the plant to shed its leaves. With fewer leaves, the coffee tree is then less capable of producing energy through photosynthesis”, continues Bohne. So the affected plant lacks the resources needed to allow all of its berries to ripen. The agronomist and his team work closely with local plantation owners to protect the coffee plants from these threats. While Brazil is the world’s largest exporter of coffee – accounting for about a third of all raw coffee exports, followed by Vietnam and Colombia – the coffee world champion must rethink its approach: “The market is demanding higher-quality beans. So Brazilian farmers must learn how to produce high-quality coffee”, explains the Bayer

coffee expert. This is where Bayer CropScience’s crop protection technology can make a contribution – by supporting the farmers with effective fungicides and insecticides. Because once a plantation is affected by coffee rust, it may even have to be abandoned.

“To protect the coffee plants, we bring active substances from Germany and adapt them so that they can be applied in the field under special South American conditions”, explains the agronomist. “Combination products for use against both rust and leaf miner are very much in demand at the moment. For many years, we’ve been selling a granule formulation of Baysiston®, comprising a mixture of the active substances triadimenol and disulfoton. But since 2008, we have had a new liquid formulation: Premier® Plus, containing triadimenol

Coffee rust
(*Hemileia vastatrix*)



Coffee leaf miner
(*Leucoptera coffeella*)



and imidacloprid”, continues Bohne. “This means that we are able to offer coffee farmers in Brazil a flexible concept for controlling the most important pests and diseases”.

Bayer CropScience’s innovative solutions don’t stop at the active substances – they also extend to payment systems that are appropriate for the region. After the harvest, the farmers pay for their crop protection inputs in the form of a pre-defined number of sacks of coffee, as agreed at the beginning of the season. Bayer does not receive these goods directly. Instead, the farmers deliver the beans directly to an exporter, who then pays Bayer CropScience the corresponding proportion of the proceeds. The advantage for the farmer is that at the end of the season, he knows exactly how many sacks of coffee he has paid for his crop protection package, and can see how this technology translates into increased yield.

Flexibility in controlling pests and diseases

The farmer takes the mature, red berries to large washing stations. Each berry contains two seeds lying opposite each other – these are familiar to us as coffee beans. Machines squeeze the seeds from the fleshy part of the fruit. The silver skin still sticking to them is removed in a fermentation process driven by enzymes. Later, the cleaned beans must be dried for several weeks, after which they can be put into store. “All the way down the processing and trading chain, the beans from different farmers are continually being mixed and sorted”, explains Dallmayr Coffee’s Dengler. “The equivalent to ‘blending’ in wine is, for coffee, a process of sorting beans according to their colour and properties. This determines the characteristic flavour”, continues the coffee expert. In other words, coffee is not a uniform product. There are in fact so-called ‘single origins’ (coffee beans that all derive from a particular plantation), but these are not usually sold on their own. “Coffee beans can vary in their flavour in the same way as grapes from individual wine-producing areas do”, says Volker Meyer-Lücke, who is responsible for raw coffee purchasing at Dallmayr. This is why Dallmayr’s buyers have to consult the various cultivating countries and exporters twice a year in order to be able both to judge the amount and



During the roasting process the characteristic flavor of coffee is produced. Roasting coffee transforms the properties of green coffee beans into roasted coffee products.

Chemical reactor in the bean

When raw coffee beans are roasted, three things happen: the bean changes its colour from greenish-yellow to brown, it increases in size by about half as much again, and becomes lighter. Moreover, certain processes occur deep inside the bean that will eventually conjure up the aroma. Whilst the beans are in the roaster, each of their individual cells mutates into a sort of chemical reactor: sugars decompose and substances are released from the cell wall, which becomes ever more permeable and porous with increasing temperature. Carbohydrates and proteins degrade, react with each other and bind to aromatic substances and brown pigments: up to 1.000 new substances arise within the cell. This is the result of the so-called Maillard-reaction, which is also involved in developing the aroma of freshly-baked bread.

Gases are also formed, and these cause some cells to burst. But a well-controlled roast means that most cells remain intact. The high internal pressure within the cell not only stretches the cells considerably, it also accelerates the chemical reactions involved in the development of a good aroma. As soon as 250 degrees Celsius has been reached, the beans must be rapidly cooled. In this way, the substances are retained, precipitating onto the cell walls. To retain the aroma for as long as possible, the milled coffee must be handled appropriately. Moisture and oxygen are the greatest enemies of the taste of coffee, so the rule is: store in a cool, dark place. The best thing to do is to chill the coffee powder in the fridge before its next appearance as a hot drink.

quality of the forthcoming harvest, and to commission forecasts for the following season. According to Meyer-Lücke, “The challenge lies in creating the typical Dallmayr aroma from a collection of single origins.” Because each individual component of this blend possesses the profile characteristic of its country of origin.

Indeed, coffee-tasting is similar to wine-tasting: the talk is of aroma, acidity, body, finish and aftertaste. A sommelier needs a sensitive nose and a lot of experience: these are also pre-requisites for the ability to judge coffee. The roasting step has a particularly important influence over these parameters (see also

“Chemical reactor in the bean”). “We can have samples sent in advance. We then roast these small quantities and try them out”, explains Meyer-Lücke in the tasting room in Munich. “Each of the individual components of a blend are tested several times. This can mean that I have to taste up to 300 cups a day”, continues the coffee expert. This is in contrast to tea, where the testers only manage at most 50 cups a day, because the taste buds become dulled by the tannic acids much more quickly than in the coffee test. ◀

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