Plantextrakt – Tea for industries; refreshing tea ideas for the food and beverage sector
Innovations from Plantextrakt – The Basis for your Success

Plantextrakt can offer you everything you need from a single source: The best raw materials, innovative products and customised services. As the leading company in the development and production of Tea and Herbal Extracts and Decaffeinated Teas, we put all of our international experience and product expertise at your disposal to ensure your success.

Plantextrakt has been harvesting and processing raw materials for more than 75 years. Use the knowledge of our 2,500 employees to establish your success in the market.

A driving force inspires new ideas
Our efforts are continuously oriented towards developing new ideas for our customers. We take advantage of the endless possibilities offered by tea to create new extract formulations, flavour profiles and substances, which lead directly to innovative products of tomorrow.

Global expertise
Being a member of the nature network®, Plantextrakt can guarantee you a head start when it comes to innovation. This global network of major plant-based brands ensures more than just a secure supply of raw materials. A full range of expertise from around the world is at our disposal – and available to our customers. It is this international knowledge and experience that drives the extraordinary innovative power of Plantextrakt.

Successful with Tea
A pronounced upward trend is particularly evident in the popularity of our products based on Black Tea, Green Tea and White Tea. And this is hardly surprising as tea is the world’s second most frequently consumed drink after water. Green Tea, especially, is becoming an increasingly sought-after ingredient because of its health-promoting properties. We meet these demands with an extensive range of high-quality extracts and tea flavours.

Flavouring, colouring and active substances from Tea
This brochure gives an overview of our comprehensive product range:
- Black, Green and White Tea Extracts
- Decaffeinated Black and Green Tea Extracts
- Natural Black and Green Tea Flavours
- Decaffeinated Black, Green and White Tea

Experience the incredibly multifarious world of Plantextrakt, and let our wide range of products and services inspire you to create new ideas!

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Known for thousands of years, tea (Camellia sinensis) is a plant that has become famous throughout the world as a hot beverage. The tea bush grows in warm, tropical highlands and is kept to a height of approx. 1 meter through regular cutting and picking. The best quality is obtained if only the top two leaves and the bud are plucked during harvesting. The world’s most important cultivation areas include China, India, Sri Lanka, Indonesia and some African countries.

**Health from nature**

Tea contains all sorts of physiologically effective substances. Green Tea, in particular, is known for its functional and healing effects. Since the leaves have not been subjected to oxidation by enzymes, the polyphenols contained in Green Tea are primarily catechins, including epigallocatechin gallate (EGCG), which is a particularly powerful bioactive agent.

The first thing we notice when enjoying a cup of tea is its stimulating effect. The caffeine that it contains releases such messenger substances in the brain as dopamine or serotonin, which stimulate the central nervous system and considerably improve our mental capacity [1]. This effect was proven in the course of extensive tests conducted in the mid 1990s [2].

### Ingredients of Green and Black Tea, based on dry weight in %:

<table>
<thead>
<tr>
<th>Component</th>
<th>Green Tea</th>
<th>Black Tea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caffeine</td>
<td>3 - 4</td>
<td>3 - 4</td>
</tr>
<tr>
<td>Total Polyphenols</td>
<td>25 - 35</td>
<td>~ 30</td>
</tr>
<tr>
<td>- Flavon-3-ole</td>
<td>17 - 30</td>
<td>~ 10</td>
</tr>
<tr>
<td>- Flavonols</td>
<td>3 - 4</td>
<td>~ 5</td>
</tr>
<tr>
<td>- Phenolic acid, Depside</td>
<td>~ 5</td>
<td>~ 4</td>
</tr>
<tr>
<td>- Theaflavin</td>
<td>~</td>
<td>0.3 - 1.8</td>
</tr>
<tr>
<td>- Thearubigen</td>
<td>~</td>
<td>9 - 19</td>
</tr>
<tr>
<td>Aminoacids</td>
<td>~ 4</td>
<td>~ 4</td>
</tr>
<tr>
<td>Organic acids</td>
<td>~ 0.5</td>
<td>~ 0.5</td>
</tr>
<tr>
<td>Polysaccharides</td>
<td>~ 13</td>
<td>~ 13</td>
</tr>
<tr>
<td>Proteins</td>
<td>~ 15</td>
<td>~ 15</td>
</tr>
<tr>
<td>Lipides</td>
<td>~ 3</td>
<td>~</td>
</tr>
<tr>
<td>Volatile components</td>
<td>0.01 - 0.02</td>
<td>0.01</td>
</tr>
</tbody>
</table>


Green Tea, Black Tea, White Tea, Oolong Tea or Pu-Erh–Tea – they all come from the same plant: Camellia sinensis. With **Black Tea**, the phenolic substances of the leaves are oxidised by enzymes contained in the cell’s own juices, which react with aerial oxygen. During this process, the monomeric polyphenols of the leaf, such as catechin, epicatechin, epigallocatechin or epigallocatechin gallate, polymerise into different long chained polyphenols like theaflavine or thearubigine.

This process is shortened for **Oolong Tea**, while Green and White Tea are made from unfermented leaves.

It is necessary to deactivate the enzymes responsible for polyphenol oxidation in the **Green Tea** manufacturing process. The freshly plucked tea leaves are heated up by steaming or pan firing.

**As far as White Tea is concerned**, the plucked tea leaves are dried immediately, without any further processing. The best grade of White Tea is made by plucking just the unopened young shoots of the tea bush, which are immediately dried in the sun. This type is referred to as “silver needle” because of the tiny silvery hairs on the buds. Bai Mu Dan is another popular type, which is produced by plucking a proportion of two leaves and a bud and these are also just dried in the sun after plucking. White Tea therefore comes closest to the natural product actually grown on the plantation.

The **Pu-Erh-Tea manufacturing process** is the other extreme, in which the fresh tea leaves are oxidised for an extremely long period lasting between three and 30 years. Oxidation takes place under controlled temperature and humidity conditions. This production process gives Pu-Erh-Tea its typically earthy taste and an extremely dark brew.
Tea Manufacturing

Plucking

Steaming
Roasting

Withering

Mechanical rolling

Short
oxidation

Long
oxidation

Controlled
oxidation
3–30 years

Drying

Sorting

White Tea
Green Tea
Oolong Tea
Black Tea
Pu-Erh-Tea
Functional Properties

A stimulating drink and a medicinal plant

What makes Green Tea special is its reported capacity to prevent cancer, strokes, heart attacks, high blood pressure and many other, often serious illnesses. This is primarily due to its antioxidant potential, i.e. its reaction to the free radicals which are constantly being created during metabolic processes. Also known as Reactive Oxygen Species (ROS), these free radicals attack the human cell structures and damage the DNA. Our cells contain the body’s enzymes, which are able to neutralise the quantities of ROS that occur under normal conditions. A surplus of free radicals can also build up as a result of stress, environmental pollution, diet and many other factors, however, and this can have undesirable consequences. Free radicals can accelerate the aging process, damage blood vessels and are thought to cause many forms of cancer by reacting with DNA (3).

Natural antioxidants

Antioxidants that are absorbed with food, such as vitamins C and E, which trap the free radicals in the body, can provide protection against damage of this type. The Green Tea polyphenols (GTP) are among the strongest natural antioxidants (4). Their antioxidative potential is 20 to 30 times stronger than that of vitamins C and E (5).

Tests have demonstrated a resistance to carcinogenic substances after the administration of Green Tea. In irradiation tests, the regular addition of GTP to drinking water produced increased resistance to skin cancer (6). Studies indicate that polyphenols from Green Tea can slow down the growth of tumour cells in the breast, large intestine, lungs and skin (7) – results which clearly prove that Green Tea can help prevent a wide range of cancers.

Studies in Japan and the U.S.
Epidemiological studies from Japan also substantiate the anticancer effect of Green Tea as found in laboratory trials: In the Prefecture of Shizuoka, an area in which large quantities of Green Tea are consumed (around 8 to 9 cups a day), the mortality rate from cancers is well below theJapanese average (8). A study carried out on 472 American breast cancer patients also showed that drinking Green Tea was able to clearly reduce the renewed formation of cancer cells after an operation (9).

Get fit with Green Tea
While discussing the health-promoting properties of Green Tea, we must be sure to mention its antibacterial effects as well, including the way it affects caries bacteria, for example, or bleeding gums (10). Furthermore, Green Tea has also been found to promote weight loss in tests performed on animals, even where food with a high fat content was administered at the same time (10). This effect has now also been demonstrated in humans (10), providing yet further proof of the amazing healing powers of the ancient cultivated plant that is tea.

Green Tea and Cognition
Plantextrakt has conducted a scientific study to investigate the effects of a soft drink containing a decaffeinated Green Tea extract enriched with L-theanine and theogallin. The study was carried out with 12 healthy human volunteers in a randomised, placebo-controlled, crossover study. The results clearly showed neurophysiological effects located in frontal brain regions, indicating an improvement of cognitive function. (12, 13)

The tea extracts in our extensive portfolio are used in several areas of the food and beverage industry. Most of our Black, Green and White Tea Extracts are processed in accordance with the individual needs of our customers. Unique technologies and individual handling guarantee a product quality tailored to any specific requirements.

We obtain our extracts from selected teas from all over the world.

Soft, powdered, calcium stable and granulated extracts, which are soluble in hot and/or cold water can be produced to comply with our customers’ specifications. We are capable of meeting virtually any requirements regarding colour, structure and bulk density. If not otherwise specified, standard tea extracts contain a minimum of 3% caffeine. The polyphenol content of Black Tea Extracts usually amounts to approximately 20%. Green Tea Extracts may be standardised according to minimum catechin content, e.g. min. 10%, min. 30% or min. 60% (only soluble in hot water). Decaffeinated Tea and Green Tea Extracts have a maximum residual caffeine content of 0.4%. Plantextrakt has developed specific tea extracts, which are also stable when used with/in natural spring water or water fortified with calcium.

This means that producers wishing to use water with a high calcium content are also able to use Plantextrakt’s tea extracts and thereby minimise the risk of precipitation. As far as the demands of different religions are concerned, all kinds of tea extracts and decaffeinated teas are produced under Kosher and Halal supervision and can be supplied with the appropriate certificates.

Plantextrakt is also certified to sell Organic (EU Organic as well as US NOP) and Fair-trade tea extracts.
Decaffeinated Black, Green and White Tea
Plantextrakt is the leading supplier of Decaffeinated Black, Green and White Teas worldwide. Decaffeinated teas have a high antioxidant potential that is well recognised by health-conscious consumers. Consumers who are sensitive to caffeine prefer decaffeinated teas, which are also very suitable for children. At Plantextrakt, decaffeinated teas are produced by means of a CO2 decaffeination process or using a direct method with ethyl acetate as the solvent.

Decaffeinated Black, Green and White Tea
We offer Tea blends from various origins all over the world

Decaffeinated Teas show a maximum level from 0.1 to 0.4 % Caffeine

<table>
<thead>
<tr>
<th>Product</th>
<th>Origin / Blend</th>
<th>Caffeine</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2 Decaffeinated Tea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 Decaffeinated Tea organic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethylacetate Decaffeinated Tea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 Decaffeinated Green Tea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 Decaffeinated Green Tea steamed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 Decaffeinated Green Tea organic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethylacetate Decaffeinated Green Tea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO2 Decaffeinated White Tea</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These natural flavours are available in liquid and powdered form and are therefore suitable for virtually any application, particularly including beverages and instant preparations. We are also able to offer liquid tea flavours with Kosher and Halal status as we have other solvents at our disposal apart from ethyl alcohol. Plantextrakt Natural Tea and Green Tea Flavours are clearly water soluble, colourless to pale yellow and free of caffeine.

No halogenated solvents, such as methylene chloride are used. The CO2 process is the preferable alternative for decaffeination of Green Tea, as caffeine is removed selectively while the majority of catechins remain in the product. Most Black Teas are decaffeinated by means of the direct method, using ethyl acetate.

Natural Tea Flavours
Plantextrakt has been processing tea for over 20 years. Our unique knowledge of the chemistry and individual characteristics of teas from different origins enables us to protect and maintain the highly sensitive and unique best flavour quality of the “two leaves and a bud”. This enables Plantextrakt to offer all Natural Tea Flavourings FTNF (From The Named Fruit), which are considered to be among the best Black and Green Tea Flavours available in the world.

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### A Full Range of Tea-Products for your Markets

**Ready-to-drink beverages**
- Ice Tea
- Tea and Fruit combinations
- Soft drinks
- Functional drinks
- Flavoured waters
- Near Water products
- Infant Teas

**Instant beverages**
- Ice Tea
- Tea and Fruit combinations
- Infant Teas
- Products for vending machines

**Decaffeinated Teas**
- For Tea bags
- Decaffeinated Leaf Tea

**Confectionary**
- Tea candies
- Chewing gum
- Chocolate products
- Bars

**Dairy products**
- Yogurt/yogurt drinks
- Desserts
- Ice cream products

**Various products**
- Breads and baked goods
- Seasonings
- Food supplements/ Neutraceuticals

**Non-food products**
- Extracts for cosmetic applications
- Cosmeceuticals
- Fragrances

**Pet-food products**
- For dogs and cats
- Dry foods
- Wet foods
- Snacks

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PlanteXtrakt provides a full range of services that covers everything, from customised product development right through to a comprehensive spectrum of documentation and technical support. We offer valuable advice and professional project management in the following areas:

**Product development**
- Formula development
- Formula optimising
- Concept development
- Processing technology

**Scientific support**
- Product documentation
- Certificates
- Literature research
- Analytical services

**Certification**
- Organic
- Fair trade
- Kosher
- Halal
- Others

**Marketing support**
- Analysis of existing as well as new markets
- Information on the latest trends
- Support for launches

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**Notice**
The information contained in this brochure is the result of our findings and experience. It represents the best of our knowledge and belief and its intended purpose is to advise our customers. However, the information is of a non-binding nature only. Industrial property rights belonging to third parties must be observed. Dosage recommendations are not to be taken as a substitute for preliminary trials in individual cases, which are imperative for the intended use of the individual product. Furthermore, before sale of the products it must in all cases be ensured that the product meets all local legal requirements.