



EXTRACTS

Innovation in Natural Food
Colouring and Flavouring

**OUR GLOBAL DISTRIBUTION
AVAILABLE IN 49 COUNTRIES**

WHY PLANT-EX?

Established in 2010 and boasting an industry experience of more than 25 years, the Plant-Ex team has developed a portfolio of ingredients which are supplied into the food and feed industries across the globe. Individual development laboratories combined with the experience of a multitude of different applications means that the organisation knows how to deliver a product that performs.

Taste, colour and function are critical elements in nutrition for both humans and animals. Our expertise spans the three subjects, and our factories and raw material routes are well placed to give customers and their animals the best options that nature can offer.

Taste Pallatability, flavour and preference

Colour Appearance, differentiation and brand value

Function Nutrition, shelf life and health

*Talk to our team about legislatively compliant options with supportive studies assured to assist in the development of great products.



WHAT IS AN EXTRACT?

Our extracts are derived from herbs, spices, fruits, vegetables and many other food ingredients. They are simply processed into convenient liquids or powders and are ideal for use in a massive variety of products.

- Clean label declaration – from the named source ingredients.
- Provenance of ingredients.
- High impact at low dosages.
- Standardised flavour profiles for batch consistency
- Improved format for handling and storage



Vinegar Powder	Vegetable Powder	Oleoresins	Fruit Powder	Emulsions	Encapsulates	Essential Oils	Alcohol	Diverse
Spirit Vinegar Malt Vinegar Balsamic Vinegar White Wine Vinegar Red Wine Vinegar Apple Cider Vinegar Sherry Vinegar Acetic Acid	Carrot Leek Onion Beetroot Cabbage	Paprika Turmeric Black Pepper Capsicum Ginger Coriander	Citrus Berries Tropical Tree Fruits	Water Dispersible Oils & Oleoresins	Oil Powder Oleoresin Powder	Flowery Citrus Spicy Woody Herbal	Wines Spirits Beers Ciders	Honey Powder Sugar Powder (Molasses Syrup) Soy Sauce Powder Worcester Sauce Powder

WWW.PLANT-EX.COM
VISIT OUR WEBSITE TO GET MORE INFORMATION

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THE PLANT-EX EXTRACTS DIVISION IS COMPRISED OF THE FOLLOWING CATEGORIES:

Water-Soluble Powders

Can be made by:

- Spray drying (e.g. mixing honey with maltodextrin and spray-drying)
- Blending powdered raw materials (e.g. diluting rosemary powder with maltodextrin)
- Plating oil-soluble liquids onto salt, sugar or maltodextrin (plating garlic oil onto salt)

Powdered Products:

- Spray-dried fruit and vegetable juices
- Spray-dried wines, beers and spirits
- Spray-dried sauces, condiments and vinegar
- Spray-dried spice and herb extracts
- Spray-dried fixed oils/fats
- Spray-dried citrus, mint and flower oils

Oil-Soluble Liquids

Can be made by:

- Diluting oil-soluble raw materials (e.g. diluting ginger oil with rapeseed oil)
- Steam distillation to produce essential oils
- Solvent extraction to produce oleo-resins.
- Cold pressing to obtain solvent-free oils

Liquid Products:

- Herb and spice extract emulsions
- Herb and spice oils
- Citrus, flower and mint oils
- Seasonings and spice blends
- Fat/Oil-based emulsions – MCT, coconut, avocado, olive oil, sunflower oil

Water Soluble Liquids

Can be made by:

- Emulsifying oil-based raw materials (e.g. garlic oil or black pepper oleoresin)
- Ethanolic extraction of vanilla beans
- Concentration of juices and purees

EXTRACTS CHECKLIST

- **Format** – Powder or liquid?
- **Solubility** – Oil-soluble or water-soluble?
- **Application** – What will the product be used in?
- **Target cost** – is there a price that needs working to?
- **Active ingredient content** – is there a specific active ingredient percentage that should be in the product (e.g. capsaicin)

*The format and solubility of the extract you choose will depend upon what the product will be going into.

*For example, if the product will be going into a dry application (e.g. sports nutrition protein blend, dry seasoning mix), you would need to use a powder.

If the application is a water-soluble liquid (e.g. beverages), then you would ideally use a water-soluble liquid, although a water-soluble powder may be acceptable.

*For instances where the application uses a mixture of powdered and liquid ingredients (e.g. bakery), you could use either a powder or a liquid product.

If the application is fat/oil-based (e.g. butter, cheese), you would want to use an oil-soluble liquid.



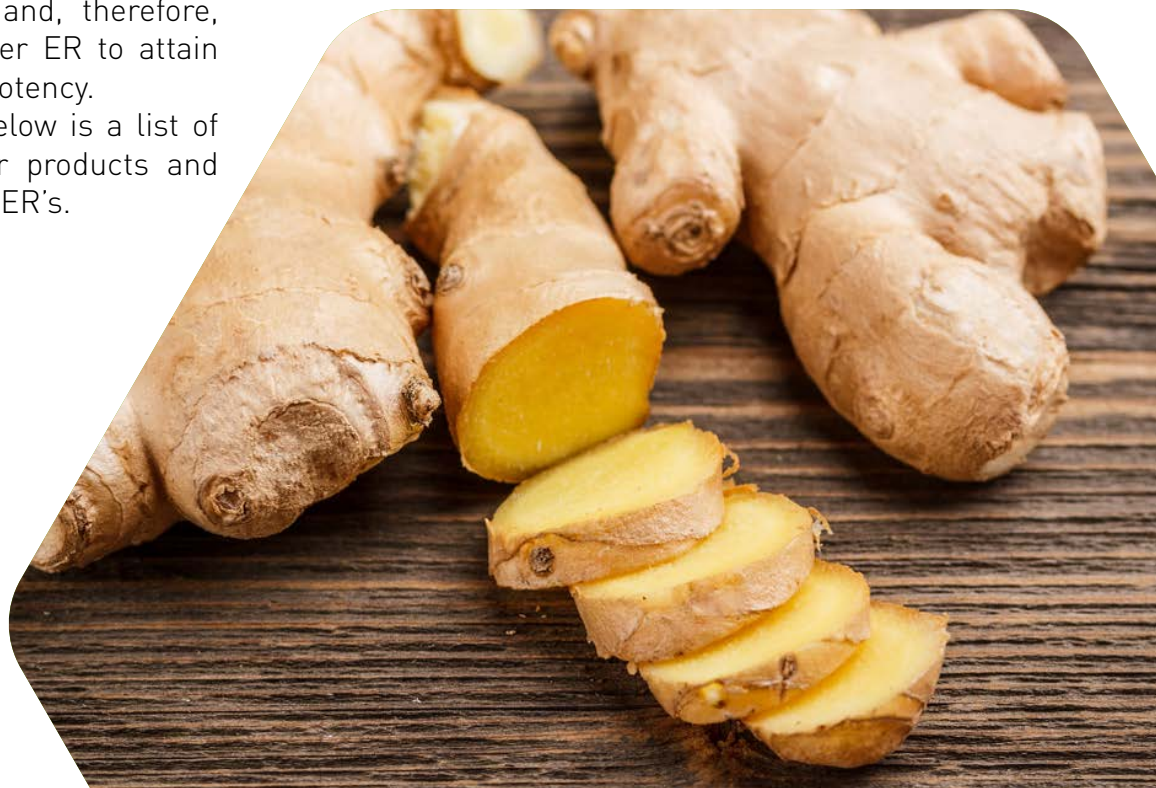
EXTRACTION RATIOS

Extraction ratio (ER) is the term given to how much oil/oleoresin replaces the actual dried herb/ground spice.

Essential oils have a typically higher ER than oleoresins. This is because the extraction method of oils uses less of the plant material and, therefore, requires a higher ER to attain the equivalent potency.

For example, below is a list of Plant-Ex Ginger products and their respective ER's.

Product Code	Product Name	Extraction Ratio (Dried Herb/ Ground Spice : Plant-Ex Product)
FI016082A	Ginger Oil	~ 300 : 1
FI012474A	Ginger Oleoresin	~ 30 : 1
FI014225A	Ginger Extract Powder	~ 15 : 1
FI015967N	Ginger Extract	~ 15 : 1



EXTRACT PROCESSING TECHNOLOGIES

SOLVENT EXTRACTION

A typical solvent extraction procedure firstly involves plant material being crushed and ground. The powder obtained is then suspended in a solvent, typically acetone or hexane, and mixed at ambient temperatures for several hours. The extract is filtered out, and any insoluble parts processed again until the extraction is complete. Lastly, the different extractions are mixed, and the final solution is concentrated through the evaporation of any residual solvents.



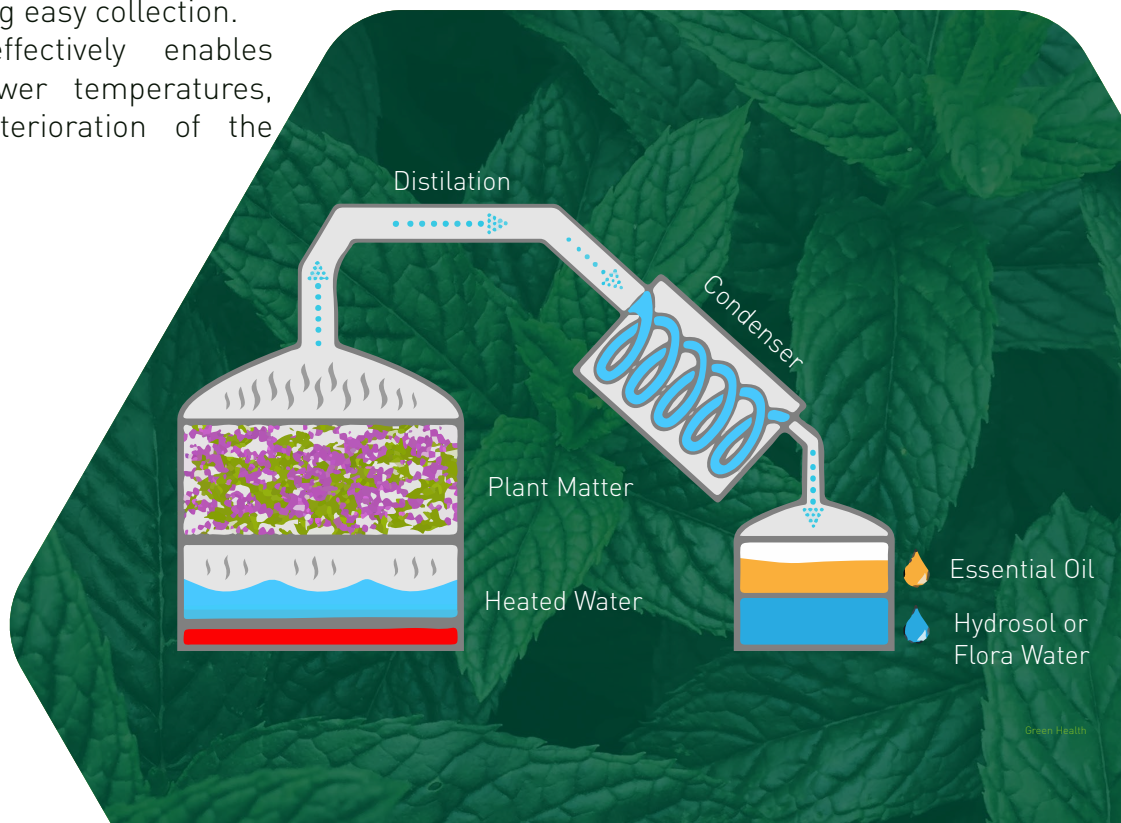
EXTRACT PROCESSING TECHNOLOGIES

STEAM DISTILLATION

Steam distillation is used primarily for temperature-sensitive materials, like natural aromatic compounds. Many organic compounds tend to decompose at high sustained temperatures.

Separation by distillation at the regular boiling points is not an option, so water or steam is introduced into the distillation apparatus. The water vapour carries small amounts of the vaporized compounds to the condensation flask, where the condensed liquid phase separates, allowing easy collection.

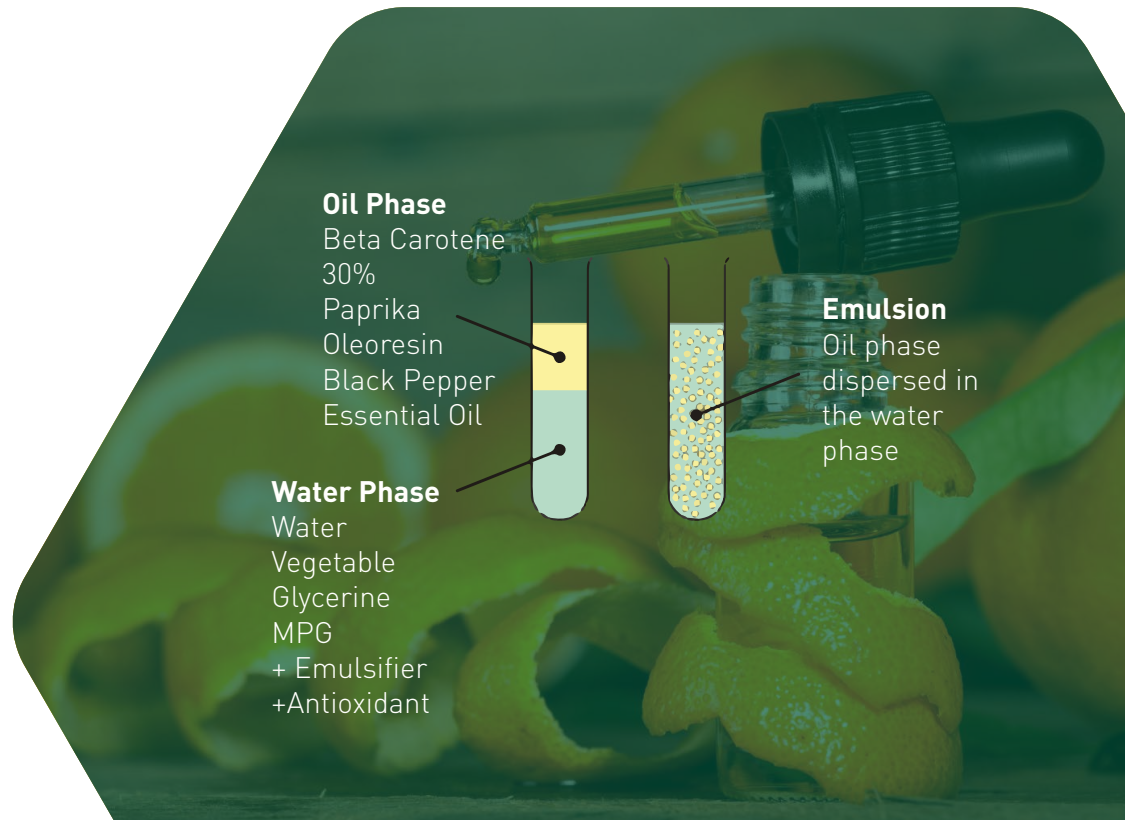
This process effectively enables distillation at lower temperatures, reducing the deterioration of the desired products.



EXTRACT PROCESSING TECHNOLOGIES

EMULSIONS

- Oils and water don't mix. Oil is less dense than water, so it will float on top
- We create oil in water emulsions, where oil droplets such as beta carotene are evenly dispersed in a water phase.
- An emulsion requires energy and emulsifiers/surfactants to remain stable:
Emulsifiers we use: Gum Acacia, Sucrose Esters, Polysorbates
Energy input: High shear mixers, Homogenisers



EXTRACT PROCESSING TECHNOLOGIES

SPRAY DRYING

Spray drying is the process whereby liquid ingredients are turned into powders.

*The raw materials are mixed or emulsified with water and carriers/emulsifiers (e.g. maltodextrin, gum acacia, modified starch) and fed into the nozzle where it is then sprayed under high pressure into the main chamber, along with hot air which instantly evaporates the water, leaving just the solids behind.

*The resulting powder is collected in a cyclone before being sieved and packed.



EXTRACT PROCESSING TECHNOLOGIES

SPRAY DRYING

Production Consideration

*Spray drying can be complex, with setting up and clean down procedures accounting for a significant element of production cost. For this reason, it is preferable to produce a large batch of a product as the cost per kg will be lower.

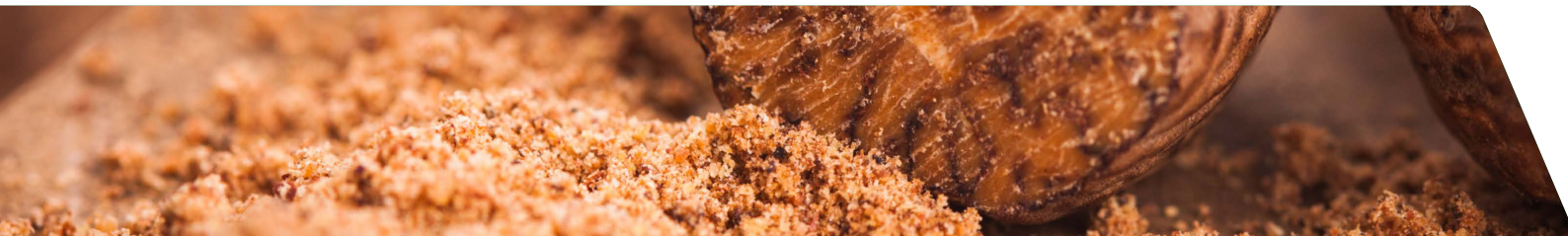
*The yield and drying time of spray-dried products can vary depending on the raw material being dried and the % it is used in the product.

*Raw materials with a high % solids are optimally dried with more carrier e.g. Honey, and products with low % solids can be dried with less carrier, e.g. Red Wine.

*Products with long drying times, or poor/low yields, will cost more per kg to produce.

*Raw materials possible to spray dry: Essential oils, oleoresins, Honeys, Molasses, Vinegars, Sauces and Condiments, Fruit and vegetable juices and concentrates.

*MOQ of raw materials can determine final batch size.



EXTRACT PROCESSING TECHNOLOGIES

SPRAY DRYING

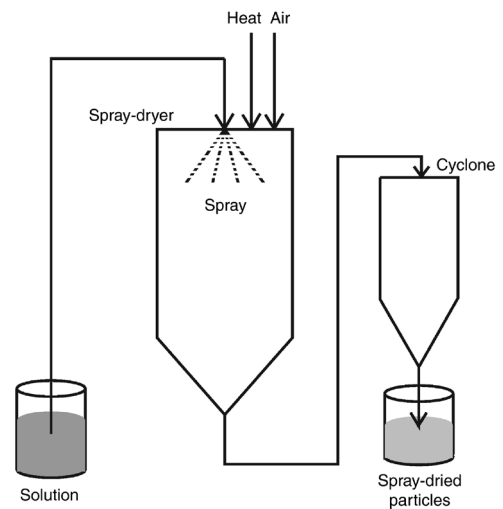
*A spray dried product has better handling and storage characteristics compared with liquids, meaning ambient storage with longer shelf life due to low moisture content, as well as convenient format for handling/dosing ingredients like Honey, Syrups and Molasses.

*Spray drying is a simple form of encapsulation - sensitive extracts and oils are more stable in powders and less likely to oxidise or degrade when stored.

*Spray dried powders are water soluble and easily dissolve in water based food products.

*Spray dried powders can be easily blended with other dry ingredients.

*Can be hygroscopic so must be stored in sealed bags away from humidity and moisture to avoid clumping.



NUTRACEUTICAL INGREDIENTS

The definition of a Nutraceutical ingredient is as follows:

“A nutraceutical product is a food or fortified food product that not only supplements the diet but also assists in treating or preventing disease and so provides medical benefits.”
Plant-Ex can supply a variety of these products, which have become more prominent recently as producers are looking to add health claims to their products.

Examples include Matcha Green Tea Powder, Apple Cider Vinegar, Kombucha and Green Spirulina.



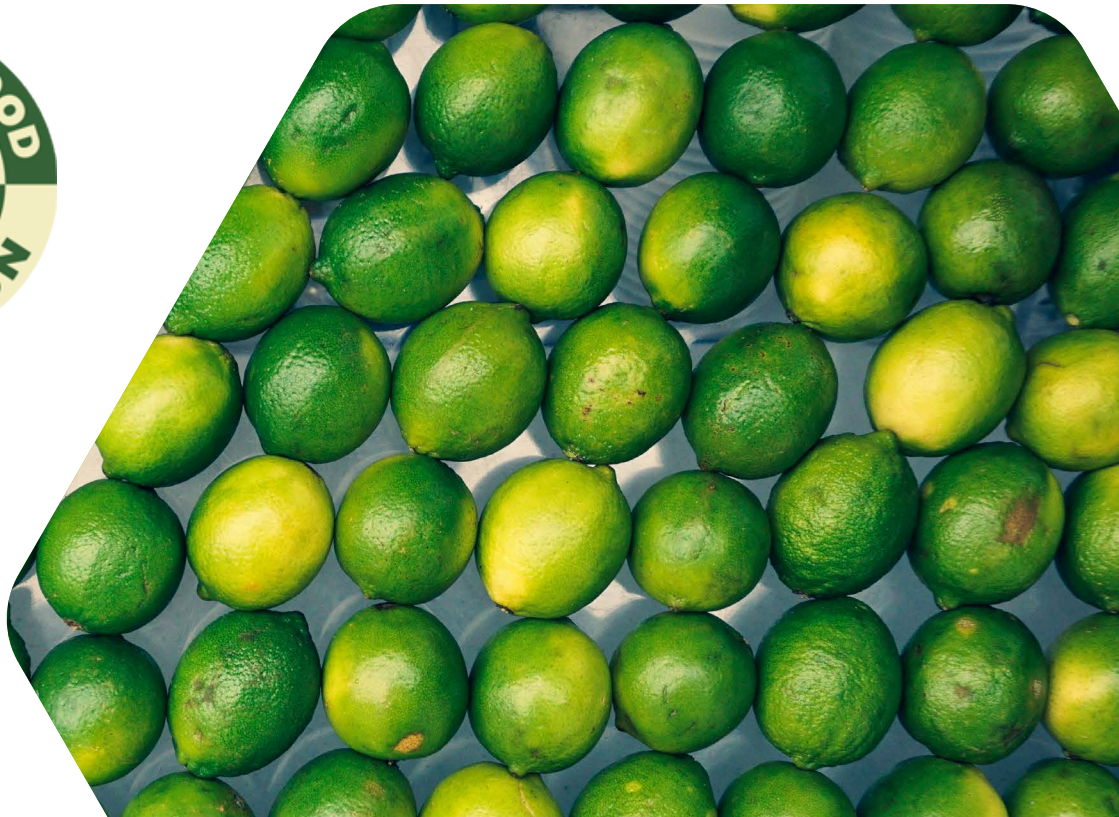
ORGANIC PRODUCTS

The organic sector is an ever-growing market and one of which Plant-Ex is proud to be a part of.

Having gained our certificate of conformity from the Organic Food Federation, Plant-Ex can provide quality organic ingredients to suit our customers' needs.

Available on request, new products and raw materials require certification before they can be declared organic.

Available raw materials include fruit juices and essential oils.



PLANT-EX EXTRACT MATCHING

Plant-Ex can match an extract or create a custom extract for your application. Our extract laboratory can help to:

- *Match an existing extract or create a custom product.
- *Remove unwanted ingredients (e.g. palm oil, preservatives, allergens, colours).
- *Create industry-specific portfolios across a wide range of food industry applications.

NPD Support includes:

- *New product development
- *Extract matching reports
- *Formulation and processing advice
- *Applications testing
- *Fast turnaround on projects and samples

For effective extract matching, we would require a sample of the current product and the specification. With these, we can better understand the target product and swiftly provide a match.





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