Mendel University in Brno

Department of Horticultural Machinery

Grape Seed Oil

Grape seed oil is a natural product obtained by cold pressing grape seeds. This oil is golden green and is among the lightest of natural oils. It is a highly prized raw material, primarily for its positive dietary values. Among the significant elements in grape seed oil, one will find tannins (3–6%) and a wealth of antioxidants and vitamins. Over 90% of this oil is made up of unsaturated fatty acids; saturated fatty acids comprise only a small part of it.

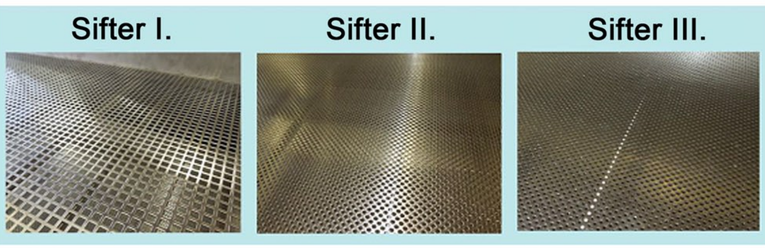
The final product
100% grape seed oil

Uses:
In medicine, it is used as an exceptionally effective antioxidant for preventing and treating a number of lifestyle diseases, primarily thanks to its high unsaturated fatty acid content. Due to its regenerating and hydrating effects, it is used in cosmetics and wellness as a skin oil, massage oil, and bath oil. However, the area in which it has gained the most popularity is gastronomy. Grape seed oil is fragrant and slightly spicy and has a thin consistency. Thanks to this, it sees use in salads, marinades, and mayonnaises. But it is also suitable for use in frying and deep-frying due to its high boiling point (220 °C).

Characteristics:
The substances it contains are primarily valued for their bountiful phenols, such as procyanidin (OPC) and vitamin E. Due to these anti-oxidation properties, these substances are first-class protection against free radicals in the body. Thanks to their composition, they help to keep skin elastic and prevent premature cell ageing; these properties are harnessed widely in cosmetics. The antioxidant effects of procyanidin are fifty times more effective than those of vitamin E and eighteen times stronger than for vitamin C. Grape seeds are the only source in which procyanidin is present in large quantities. Resveratrol, which is found in the seeds and skin of blue grapes, is another important antioxidant. Resveratrol has antioxidant and antibacterial properties and exhibits broad effects on cells, tissues, organs, and the entire human organism. It prevents cell ageing, and its effects on slowing down brain degradation during Alzheimer's disease are being verified. Resveratrol's effects in tumorous diseases are also significant, thanks to its ability to block all the sequential processes behind the transformation of healthy cells into carcinogenic cells. In the composition of its fatty acids, grape seed oil contains a high share of linoleic acid (omega 6), thanks to which it has a favorable impact on the cardiovascular system, reduces cholesterol and triglyceride levels, and supports the organism during metabolic disorders. It is also used for treating skin disorders such as atopic eczema and acne.

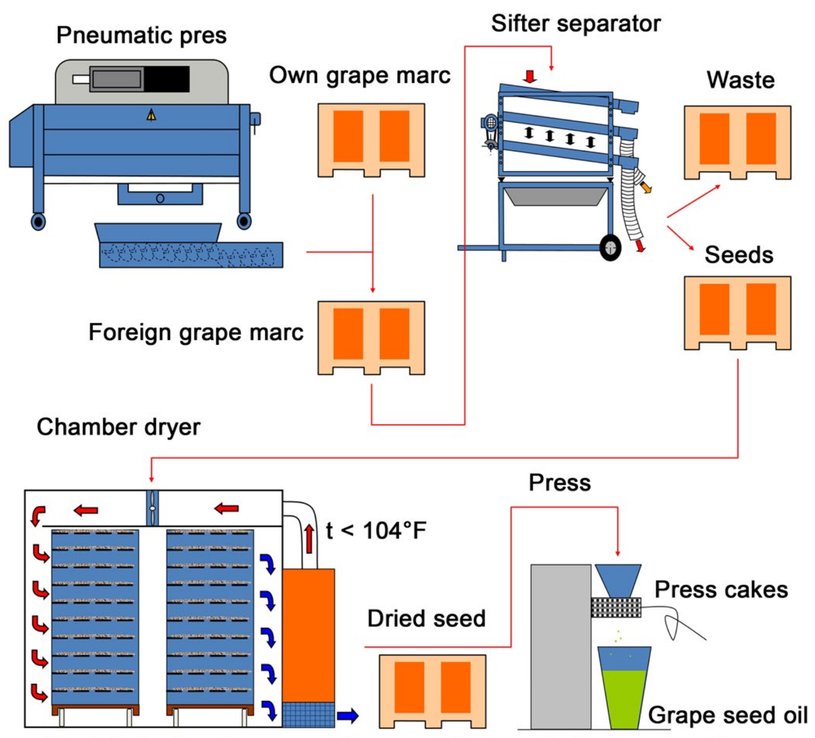
Seed separation:
Seed separation can be performed using various methods. However, methods that employ cylinder sifters have proven to be the most effective. They have the advantage of allowing continuous operation. Due to these methods' rotational motion, the materials are mixed constantly, and the particles within the separated portion pass through the calibration openings easily. The effectiveness of this method depends primarily on how moist the separated mix is. Materials with low moisture (relatively dry) are much easier to separate than materials with high moisture. Flat vibration sifters are another highly effective method for seed separation. This equipment type is used for seed separation at Mendel University's Faculty of Horticulture in Lednice. It is based on the gradual or continuous feeding of sorted material along the sifter's flat surface, in the course of which the separated material falls through the calibration holes. Movement along the sifter is facilitated via a 5–10% incline of the sifter and via an oscillating or vibrating motion. As the material passes through the first sifter, where the larger material is separated, smaller fragments of seeds and small remainders of


Flat vibration sifters



Detail of sifters on flat vibration separator

Pressing requirements:
min. temperature 15 °C
humidity 5–7%
impurity max. 2%
damaged seeds max. 2%



Model design for a seed separation and oil pressing line

Seed drying:
It is important to dry the seeds before pressing them. Several different types of equipment can be used for this. Cabinet and chamber dryers, in which the material is placed into a closed chamber into which drying air is introduced. This method is mainly suitable for small quantities of dried material, because it can only provide non-continuous operation. Table dryers are another option; in these, the material is spread out in a thin layer onto sifters, and drying air is introduced. In the summer months, natural drying is also used. Drum dryers are yet another option. In these, the dried material passes through a rotating drum fitted with blades or trays that ensure smooth movement of the material. The drying is performed using hot air flowing with, or alternatively against, the current. Belt dryers are another type of equipment used. Here the material is transported on a perforated belt past a drying chamber. The drying power and period can be changed easily by setting the transport belt's speed.

Storage:
The oil must be stored in a dark place at a temperature below 12 °C. The oil's shelf life is six months from the date of production.

Colour scale of different varieties of oils

Pressing the oil:
Cold pressing is a process in which the oilseeds are not preheated, thanks to which the oil retains a high procyanidin content. This technology is used when pressing oil from rapeseed, sunflowers, flax, and other common oilseeds. It is also suitable when pressing grape seeds. In light of the relatively small amount of seeds separated out in proportion to the amount of pomace after pressing, it is recommended that presses with adequate capacity be used. Cold pressing is performed with the aid of a screw press.

Pressing oil from the seeds using a screw press
(Farmet UNO FM 3F)

Press cakes and their uses:
Press cakes are a secondary product produced during the pressing of grape seed oil. Their use can be seen in a number of industries. They can be used as an additive in livestock feed mixes, as a form of alternative fuel, as a compostable material, or in the food industry, where press cakes are finely ground into flour. The press cake flour also retains the oil's healthy properties, and so it can be used as a healthier alternative to ordinary flour. However, grape seed flour is bitter, and thus it is not suitable for direct use. It is therefore used e.g. as an additive to ordinary flour (5–10%) when baking bread or salty baked goods, when manufacturing pasta, as an admixture in breadcrumbs, and as a roux for soups and sauces, and added into muesli.


Grape seeds


Press cakes
(leftovers from pressing)