

A hand is shown holding a stalk of green camelina plants, which are covered in small, round, green seed pods. The background is a vast field of similar plants under a clear sky.

## Possibilities of sustainable raw materials - the opportunities of camelina oil in alkyd resins

The transformation towards a more sustainable world will also challenge the coatings and raw materials industry in the coming years. We, too, would like to make our contribution and are therefore developing more sustainable binders and additives for a variety of formulations. The use of camelina oil as a sustainable alternative raw material in alkyd resins can play a significant role here - on this basis with domestic agriculture, an optimized supply and recycling chain as well as know-how, a sustainable value chain can succeed.



## Sustainability factors according to which we evaluate and develop our products

The development of sustainable products has been with us for a very long time. Even without legal or social pressure, it has always been our ambition to be able to offer improved and more durable products and solutions for a wide range of applications. Developing high quality products in collaboration with our customers remains our main focus.

Over the decades, we have gained a lot of experience in developing various resin technologies based on different raw materials to make products more sustainable from different perspectives. Sustainable product development must ultimately benefit the environment and society, but also take economic aspects into account. The entire supply chain must benefit. Already in our proven developments, we can take many of these different aspects into account and make resins and additives increasingly sustainable. For example, we can determine factors such as the proportion of bio based and renewable raw materials, the proportion of secondary raw materials, regionality and longevity, the hazard potential of our products and the competition of our raw materials with the food industry.

Technologically, we are well positioned with our creative departments in research, development and application technology to further orient ourselves towards sustainable products in cooperation with our customers and partners. Every new development is related to sustainability factors such as climate change and resource conservation.



### Camelina oil - a promising raw material

Linseed oil has been used for centuries to protect wood. It provides a water-repellent surface that is open to vapour diffusion, penetrates deep into the wood and can also be used outdoors due to its high elasticity. Linseed oil is already characterized by a high proportion of renewable raw materials, but it still has to be imported to a large extent, so that the consideration of various sustainability aspects also reveals possibilities for improvement.

An alternative raw material to linseed oil is [camelina oil](#), which leads to almost identical results in the application. This applies to water-based as well as solvent-based and solvent-free binders.

A chemical analysis of the two types of oils also confirms this observation.

	Fatty Acid Distribution Linseed Oil	Fatty Acid Distribution Camelina Oil
Oleic acid	22%	14 - 15 %
Linoleic acid	16 %	17 %
Linolenic acid	52%	37 %
Gondoic acid		17 %

## Areas and possibilities of cultivation of camelina oil

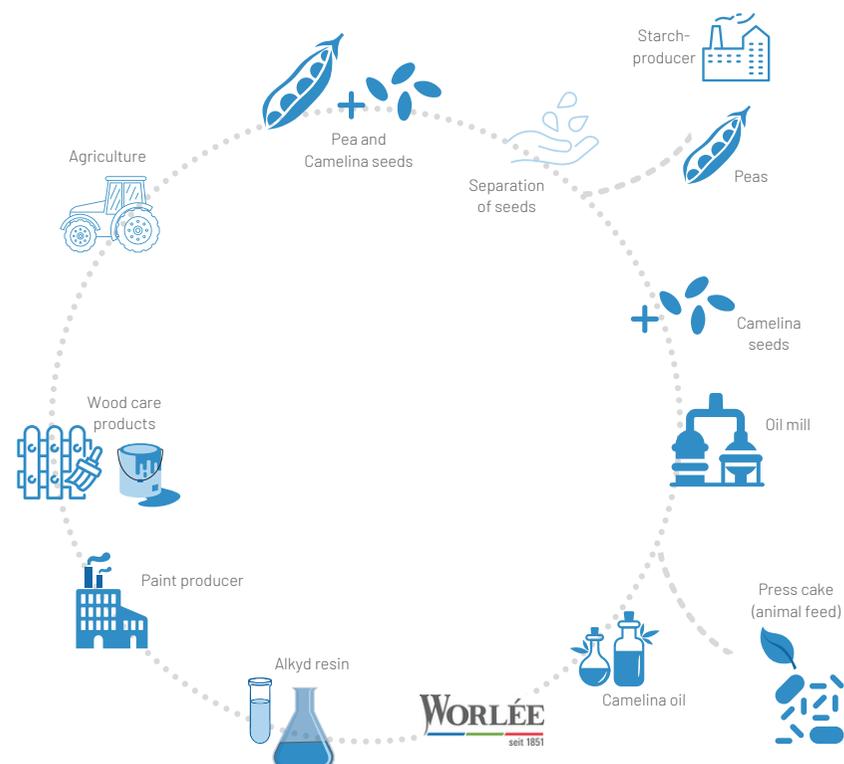
In today's world, it is of enormous importance to use raw materials that do not compete with food production. There are various approaches to this. On the one hand, there is the possibility of using the time gaps between the harvest of one plant and the sowing of the next and cultivating correspondingly fast-growing plants. There are varieties of camelina that can be planted and harvested in only about ten weeks. This is a time span that fits into many agricultural cultivation plans. On the other hand, it is also possible to follow the concept of mixed cropping, where two different, optimally complementary and mutually reinforcing crops are grown together. In the case of mixed cultivation of camelina with peas, for example, there are many synergies that can lead to facilitating the harvesting of peas. Without the climbing support provided by the camelina plant, the pea plant would be on the ground after heavy rainfall before harvesting. This makes harvesting much more difficult and can drastically reduce the yield. Last but not least, camelina can also be grown in pure culture on land that would otherwise only yield green rye or triticale for biogas plants, and is thus not available for food production. Cultivation as a pure crop after the first harvest in July increases the food supply for pollinators in a period that is otherwise quite poor in flowers and fodder. Camelina is therefore a plant with which all three concepts can be implemented.



## Short transport routes and local added value

Camelina is a robust plant that thrives well on many domestic areas. Domestic agriculture naturally offers the advantage of relatively short transport distances. In addition, sowing and harvesting can take place at the same time and the facility for separating, cleaning and drying the pea and camelina mixture is available locally. After this process, the peas are sold to a nearby starch factory for starch production. Afterwards, the seed from the camelina harvest has to be pressed to extract the oil. For this purpose, it is transported in bulk to an oil mill and pressed there. The resulting press cake can be used as valuable animal feed. The resulting camelina oil is delivered to Worlée in Lauenburg and used in the production of aqueous and solvent-based alkyd resins.

In summary, the transport distances are relatively short due to regional cultivation, which is why less energy is consumed for transport. This also means that no alternative oils have to be imported for the production of binders. This is also positive for the ecological balance.



## Other sustainability aspects: Biodiversity and efficiency

Of course, the economics for the farm to grow and provide the arable land for the camelina pea mixture plays a role. Even in very dry weather conditions, where the pea does not grow, camelina still provides a certain yield, while in very wet weather conditions the pea dominates and provides yields. This is an advantage in the course of climate change. In heavy rain or storms, for example, the pea-only fields fold over faster than the pea-and-camelina fields.

Furthermore, camelina grows very quickly and thus suppresses undesirable plants. As a result, the use of pesticides is reduced. Moreover, camelina is not sensitive to aphids, which means that fewer insecticides are needed. In addition, the pea or other legumes such as serradella, which is also used, enriches the soil with nitrogen and thus reduces the cost of fertilisers. Furthermore, the simultaneous cultivation of peas and camelina strengthens biodiversity and species diversity in and around the fields; because of its long flowering phase in June, camelina offers wild and honey bees and other flower-visiting insects an additional food source. Mixed cropping also promotes pollinators and counteracts insect mortality. As fewer herbicides and insecticides are needed, insects are less affected by these agents.

## Water-based and solvent-based alkyd resins based on camelina oil

**WorléeSol NW 274 CA** is a long oil, completely co-solvent and amine free alkyd emulsion. With its high content of renewable raw materials of approx. 75 % it allows the formulation of especially ecological glazes and wood care oils. Due to its very good compatibility with WorléeSol E 150 W, it can also be used as a combination binder to improve penetration and open time.

**WorléeKyd VP CA 8004** is a low-viscosity alkyd resin with an equally high proportion of renewable raw materials of approx. 85 %. Besides camelina oil, the alkyd is based on tall oil fatty acid as another sustainable component, which is obtained as a by-product from pulp production. WorléeKyd CA 8004 is particularly suitable for the formulation of high quality wood coatings such as glazes, clear and top coats, primarily for exterior use. It shows excellent permanent elasticity, weather resistance and very good penetration .



### Areas of application:

 Architectural coatings

## Suitable additives

Category	Water-based system	Solvent-based system
Dispersing additive	WorléeDisperse 8400 W	WorléeDisperse VP 8100 S
Defoamer	WorléeAdd 6410	WorléeAdd 373 N
Substrate wetting agent	WorléeAdd 3440	
Surface additive	WorléeAdd 3520	WorléeAdd 373 N
Siccative	WorléeAdd 2700	WorléeAdd 2560

## Complementary products

Product	Technology
WorléeTransoxid S/SF/W Yellow and Red	High-quality aqueous, solvent-based and VOC-free transparent iron oxide pastes
WorléeBlackpaste S/SF/W	High-quality aqueous, solvent-based and VOC-free soot pastes
Köstropur	Silica-based matting agents with and without after-treatment
WorléeAdd 800s	Organically modified smectite derivatives and high-purity smectites for rheology modification of aqueous and solventborne systems
WorléeThix	Thixotropic aqueous and solventborne binders for controlling rheological properties

## What's next?

Camelina can be an essential ingredient for the sustainable design of modern binder systems. We are investing in the future of this raw material, expanding the cultivation areas with our partners and planning its wider use in our portfolio. In principle, camelina oil can be used in almost all types of alkyd resins. In addition to the two existing products, we are planning to use it in other products. In this regard, there are already various development projects in the field of corrosion protection systems based on internally emulsified polyurethane-modified alkyd resin emulsions or for solvent-free one- and two-component parquet oils based on extremely low-viscosity alkyd resins.

### Let's work together

Do you have ideas for product developments? Feel free to contact us. We would be pleased about a cooperation or a joint project with you.

## Our corporate values by which we act

Since the founding year of 1851, the principle of sustainability with its three core themes of economy, ecology and social issues has been at the heart of our corporate philosophy. As a family business, Worlée-Chemie is committed to social responsibility and fair dealings with business partners and employees. We are committed to forward-looking and prudent environmental protection as well as preventive and comprehensive occupational health and safety as a corporate goal.

We are convinced that the natural resources of water, air and soil must be treated with care as part of our responsible actions. In this way, the ecosystem of which we are a part can be preserved as the basis of our living conditions for future generations. This also applies in particular to the economical and efficient use of energy and natural resources.

We stand by our responsibility for safety in production, storage and transport. We ensure that our products are handled conscientiously along the entire value chain.

Compliance with human rights due diligence is part of our company's self-image. Integrity, fairness, responsibility and a high degree of transparency are the basis for a trusting and long-term business relationship. We expect our suppliers to adhere to these principles in the wider supply chain and to recognize our Supplier Code of Conduct or provide an equivalent guideline.

