

Handelshaus Runkel

Biogene Treib- und Schmierstoffe
Pflanzenöltechnik



INFO 079

The planto-tec-process

A new technology of harnessing oil-plants in an easy and ecological friendly way for food & fuel supply.

1. Abstract

A German company has developed an additive system that allows the use of pure, native vegetable oils like rapeseed, sunflower, soya, gold of pleasure, Jatropha etc. as fuel in diesel engines without any engine or fuel system modification.

Depending on the vegetable oil part, only 2-3% admixture of the DX 52 additive concentrate to the vegetable oil is sufficient to operate the engine.

The additive ingredients are nearly 100% based on biological chemicals like modified alcohols in combination with soft ignition fertilizers and stabilizers. Therefore an environmental friendly and sustainable way to use vegetable oils instead of petrochemical diesel-fuel (DK) is given.

The processing of oil by cold-milling further allows that the residues of the process the “Press- or Oilcake” can be directly further on used for several food-stuff.

So “Food & Fuel” can be gained in a mostly environmental friendly and easy way. The technology causes no unusable resting stiff (zero-waste-technology).

The processing of oil directly to fuel is called “planto-tec-process”.

2. Introduction

The Crude-oil reserves are limited. Therefore renewable and sustainable produced energy becomes a must not only due to environmental aspects.

The possibility of the use of vegetable oil as a fuel substitute presupposes a modification of the engine but even then technical problems can not be excluded.

With the developed Additive-System it is possible to modify the oils in a biochemical way that they can be directly used like normal mineral diesel fuel.

Because of the harmlessness of the cold-oil-milling, the given press-cake can be directly processed further on to food like bread, noodles and patties.

So an easy, mostly decentralized possibility for the holistically usage of oil-plants for food and energy supply is given.

Worldwide are more than 400 different oil-plants available, who are adapted to different climate and soil conditions. With an oil production part of 1.600 – 4.000 Liter per ha it is easily possible to generate a fully substitute for the current amount of crude-oil through vegetable oils.

So a worldwide, ecological friendly and sustainable supply of energy and food through Oil-Plants is possible.

The usage of oil-plant resources would even avoid climate crises.

3. Renewable Energy (usage of biomass)

Whether in the form of heating, electricity or fuel, energy is needed everywhere.

Producing energy from fossil raw materials releases large quantities of carbon dioxide (CO₂) into the atmosphere, exacerbating the greenhouse effect.

Mineral oil also contents high amounts of sulfur that causes acid rain.

So sulfur is mainly responsible for the acidification of soil and the forest-die.

Fuel made out of petroleum or fossil components is water polluting so there is always a danger for the environment while handling and storing fossil oil.

In Siberia there are already large country-sides strongly polluted and ecologically destroyed by pipeline leaks. The soil cannot be used for years for animal feed or food production.

There is no threat of such consequences where biomass is used.

Vegetable oils emit only as much CO₂ as the plants have taken for their growth.

So a closed carbon cycle is given.

Vegetable oils are free of sulfur and are not water polluting.

So there will be no damage of ground (soil) and trees (forests) through acid rain.

The handling of vegetable oils from the processing up to transport and usage is free of toxic or other dangerous ingredients.

So a mostly harmless usage is guaranteed and cancer and other illnesses caused by air, soil or water pollution can be avoided.

Oil-plants can be cultivated everywhere, in each country and some even under extreme poor water and climate conditions. So a mostly decentralized usage is possible.

This avoids longer transport and material flow which leads to less pollution in general and less costs and makes countries mostly independent of energy supply.

In the summary the ecological advantages by using vegetable oils are:

- Mostly climate and ecological friendly
- Decentralized production (less material flows, less transport costs)
- CO₂ – neutral (no climate problems)
- Free of sulfur (no acid rain, no forest-die)
- Mostly friendly in handling (no air and water pollution)
- Good availability (worldwide cultivation, even in approximately desert areas)
- Good technical performances (including the additive part)

A decentralized, ecological friendly production is good for each country because it avoids costs for environmental pollution and brings value to economics.

4. Oil-processing

Integrated processing of oil-plants can be divided into an energy- and food-part.

While pressing oil-seeds, there is always

- 1 part of oil** (Energy supply “fuel” / Food-oil / Lubricants) and
- 2 parts of oil-cake** (animal feed / food supply / Fertilizers)

**Both parts can be fully processed (used), without any resting stuff.
So a harmless “zero-waste-technology” to gain “basic needs” is given.**

The liquid part of the oil-processing can be used as:

- Fuel (Diesel-engines)
- Oil for salad and cooking
- Technical oils (engine-oils, lubricants)

The solid components (Oilcake) of the oil processing can be used as:

- Animal feed (protein supply)
- Food (bread, noodles, patties)
- Heating material (substitute for coal, pellets etc.)
- Organic material (fertilizer)

Please have a look so far to the enhanced information sheet
INFO 056 – Floating scheme of the oil processing (*Appendix 1*).

5. The “planto-tec-process “ (Description)

With the developed additive-system it is possible to catch in a biochemical manner the Glycerin and Fat-components in vegetable oils and influence the burning characteristics so that they can be used directly as fuel in diesel-engines by a simple mixing process.

There is no need to use separators or modify the oil in a refinery.

The oil production can be done with simple cold pressing and filtering.

The technology is tested now for several years with best results in fleets of vehicles of communities like Darmstadt.

The initiator, Jürgen Runkel, is driving cars for over 10 Years nearly fully ecological equipped with vegetable-oil-fuel plus lubricants based on vegetable oils.

5.1. General

To burn vegetable oils in a combustion engine is critical.

Vegetable oils are Triglyceride and content a high part of Glycerin-Connections what often leads to unburned particles (residues) and soot emissions.

In a closed burning-system like in a combustion-engine those residues in cylinders and the combustion chamber rest inside and lead to engine failure.

So the usage of vegetable oils has been not a favorite for the engine producers beside the known situation that biomass for fuel has to be cultivated beside the food-production (Plate & Tank-Discussion).

With the development of a special additive-system (DX 52-Series) to enable vegetable oil to burn totally and efficiently, the known problems could be solved. So a fully substitute for diesel-engines is given.

The production can be made in an ecological friendly manner in a mostly decentralized way without big industrial equipment.

Depending on the different burning characteristics of the vegetable oil which will be used, several additive-compositions have been developed.

For example the standard Additive DX 52 for Rapeseed-, Sunflower-, Soya- and Cotton-Oil but also DX 52 L for the oil of gold-of-pleasure (Leindotter) or DX 52 J for Jatropa.

10 Different oils has been already tested and made usable as fuel.

Handelshaus Runkel is able with its own equipment to test the combustion-characteristics of the oils and to measure exhaust. So quickly results can be given.

The additive-part includes also components against oxidation and infestation of bacteria what guarantees a storage-time like mineral diesel.

So a one to one shift from mineral oil to vegetable oil is possible, without any new machinery or investment at local destinations.

The procedure to gain oil out of oil-seeds is shown in
INFO 059 – Functional-Scheme of the oil processing (*Appendix 2*).

In general only 2-3% of the additive-part has to be used with and has to be mixed in the vegetable oil or vegetable oil part to create a ready to use fuel.

5.2. The “Fuel-Part”

The usage of pure, native vegetable oil as fuel presupposes a sufficient cleaned oil. This can be done by using special filtering material and filtering aid stuff.

But not only sufficient filtering is necessary, the seed has to be ripe and mostly free of other stuff to gain good qualities.

By a sedimentation process and a deep-filtration-system the oil is prepared to be used. For fuel use it has to fulfill the DIN 51605 Standard.

With the additive part the burning-process can be regulated and influenced so that sufficient cleaned oil reaches the necessary DIN 51 605 requirements for fuel use. Also oxidation stability which is necessary for storage time is given.

Please have a look to the enhanced Information sheet INFO 058 – Quality standard for vegetable-oils to be used as fuel for diesel-engines (*Appendix 3*).

For engine use it is also necessary also to look to viscosity and flowability.

Depending on the chemical characteristics of the oils this has to be guaranteed even under cold conditions.

Viscosity:

Because of the much higher viscosity of for example Rapeseed oil compared with normal, mineral diesel-fuel it is necessary specially in high-injection systems like HDI, TDI etc. to use a thinner with.

Elder engine technology like pre chamber engines support vegetable oil plus additive DX 52 in general without thinner.

As thinner can be used:

- Thin vegetable oil (Groundnut-oil, gold-of-pleasure, fish-oil)
- A vegetable based, biological thinner
- Normal mineral based diesel fuel (DK) or mineral based thinners

Flowability:

Under cold conditions a special winter-additive (PW 1) has been developed so that vegetable oil can be used even under extreme cold conditions.

In the summary the following additives are available:

- **DX 52 – Multifunctional-Combustion-Additive** (DX 52-Series)
Available in different compositions depending on the oil-characteristics
- **PW 1 – Winter-Additive and cold flow improver**
PW 1 can be used in combination with DX 52.

Hint: PW 1 also works against polymerization of engine oils so that they can be left as long as with normal diesel-fuel.

To use PW 1 beside DX 52 is specially advised under cold conditions.

Only 1 up to 3 % of PW 1 in general is necessary.

For the ready to use fuel gained by this process, the name Plantanol ® has been established as a brand mark (brand name).

Because of different ingredients in the plantanol-fuel, a differentiation has been made.

- Plantanol 100 (100% vegetable oil plus the additive-part)
- Plantanol-diesel (including a mineral thinner 10-40%)
- Plantanol VB (including a fully biological thinner 5-30%)

The technical features of plantanol-diesel in a mixture of 60% Rapeseed Oil, 3% of DX 52 and 37% of DK) has been tested by the Community of Darmstadt EAD (Waste Management) and University of Darmstadt in a car fleet.

There has been given:

- Up to 61% less particle Masse (PM) of soot and particulate
- 6-10% less engine consumption (because of more engine force)

Further testing of plantanol-fuel has been done from several institutes:

- IWL - Hürth - Harmlessness against lively cultures (toxic testing)
- Pressol - good compatibility with normal engine sealing-material
- Hatz - Engine force and engine torque (6-18% plus)

Please have a look to our film-documentation on our homepage

www.handelshaus-runkel.de under Button: Plantanol-Video

No technical modification on engine, filling-stations, storage or Logistic has to be done.

This has been confirmed by the Physical-Technologic Institut in Braunschweig, Germany.

Plantanol . . . a fuel of the 3rd Generation

How good the energy-balance (Input-Output-balance) of vegetable oils are, compared with other fuel-technologies is shown in INFO 048 – Efficiency of different fuel-technologies

(Appendix 4)

Please also have a look to INFO 075 b – Current Costs of different fuel technologies per 100 km *(Appendix 5)*.

5.3. **The Food-Part**

Like already shows there are in general 2-parts of oilcake resting through cold-pressing of oil-seeds.

The Process of Refining is not mentioned here because there is a lack of Lecithin and Vitamins in the cake.

Cold pressed oilcake is loaded with Protein what is a very necessary ingredient for animal or human food and organism. Oilcake is already known for the energy-supply of animals.

The usage of this oilcake for food is relatively new and not known so far.

Experiments made by Handelshaus Runkel together with Bakers and a Bio-Caterer show,

that this cake can be used as a substitute for flour normally coming from grain (Cereals).

The oilcake has the advantage that there are no insulin drugs and ingredients in it so that food out of the flour of the oilcake is suitable for diabetics.

Oilcake and the oilcake-flour include a lot of omega 3 acids, the so called essential fatty acids. The name essential has been given because those ingredients are “essentially”.

That is why flour made out of oilcake might be a very important food-stuff in the future.

For example bread made out of rapeseed-cake or gold-of-pleasure-cake is very nutritious and can be long-time stored because of its resting oil-part.

The taste is excellent and one slice of bread is already satiating.

Handelshaus Runkel is currently involved in several projects for the usage of oilcake as

- breed
- Noodles
- patties

Handelshaus Runkel is also involved in plantation-projects of oil-trees by using integrated biologic-organic cultivation.

6. Conclusion

The integrated usage oil-plants as a renewable energy resource gives for each country an ecological friendly and sense-full option to gain food and fuel in an easy, ecological harmless and profitable way.

Using oil-plants according to the procedure “planto-tec” incur no toxic or other waste materials. It is given a mostly ecological friendly, decentralized and safe natural circulation in the whole production, distribution und consumption chain.

The technology is payable for any economy and leads to an equitable distribution of work.

Environmental risks can be avoided by organic cultivation in mixed cultures.

Energy supply plus payable mobility in an ecological mostly harmless way will be possible to everybody.

Food plus fuel will no longer be an opposition.

To the history and development of Handelshaus Runkel please have a look to INFO 067 (*Appendix 6*).

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Handelshaus Runkel / INFO 079 – planto-tec-process – a new possibility of harnessing oil-plants Stand 29.09.2009