UNION ZUR FÖRDERUNG VON OEL- UND PROTEINPFLANZEN E.V.

Rapeseed – Opportunity or risk for the future!?

From the beginning to the end of May, the blooming rapeseed forms the German landscape. It is the element which forms the cultural landscape in many regions. A new harvest grows, which started with the sowing at the end of August in the previous year. The harvest begins in July so that the cultivation cycle ends after 11 months.

But the blooming rapeseed also has an emotional effect on a large part of the population. There is no other explanation for the fact that the blooming "oil fields" draw in tourists and holiday-makers in many regions of northern Germany and hence the rapeseed also supports this industry as an important and successful advertising medium. Several thousand bee colonies are particularly "pleased" every year to be able to bring nectar and pollen into their hives. Then it buzzes in the truest sense of the word; the colony grows quickly and the beekeeper awaits a large honey harvest.

With regard to its utilisation, no other type of crop can beat rapeseed – it is the "do-it-all" of agriculture. It serves as the natural resource for producing cooking oil, margarine, mayonnaise etc. The solar energy in rapeseed oil is stored in a concentration similar to that of diesel fuel. Its fatty acid composition also makes it of interest to the lubricant industry and chemical industry. Around 60 percent of the yield accumulates in the form of rapeseed meal after it has been pressed – a high-quality protein animal feed, which reduces the import of soya from overseas. Rapeseed is by far the most important GM-free protein source. This feature is gaining in importance for milk producers with respect to the requirement of dairies to offer milk labelled "GM-free", for example.

Rapeseed under criticism – should it be used both for fuel and food?

With these diverse features, one would think that rapeseed is a "top-runner" among field crops. However, the success also has a downside, since rapeseed cultivation for the production of biofuels is heavily criticised. Rapeseed must also prove itself here with regard to its ecological efficiency and advantages. When over 6 million hectares in the European Union had to be set aside in the 90s, rapeseed was the "problem solver". It forced new markets to be opened up outside of its use for foodstuffs. The extent of the rapeseed cultivation area and hence also the processing has developed positively since then and has remained at a steady level between 1.3 and 1.5 million hectares or 4.5 to 5.5 million tonnes of harvest yield. This cultivated land complies with the limit through crop rotation, since the rapeseed cannot be cultivated repeatedly on the same land – this spans over three years in normal practice. Large-scale monocrops are therefore excluded for agronomical reasons. Experts estimate the cultivated land potential for Germany at a maximum of 1.8 million hectares.

The set-aside obligation has since been sensibly abolished. Since then, farmers have been cultivating rapeseed without knowing what to use it for. This is because it could only be decided if rapeseed oil would eventually be processed for biofuel using the further trade and processing steps. Rapeseed production must hold its ground economically in an international competition since the European Union has gradually liberalised the European agricultural markets with their decisions on the reforms of Common Agricultural Policy (CAP) and has thereby opened up market access, particularly for developing countries. The drawback of this policy, however, is the fact that the agricultural prices on the international markets and stock exchanges can fluctuate substantially without the EU Commission being able to sell excess corn, for example, as they did in the past with a price-dampening effect on the global market. In the 80s and 90s, the European Union was accused of keeping the prices on the world markets low with this export policy to the detriment of developing countries. Today, the market and hence the price are the deciding factor as for what purpose the rapeseed oil will eventually be used.

In 2008, the agricultural commodity prices increased considerably. The biofuel policy and production was made jointly responsible for this price development. It was claimed that less food would be supplied, especially for the poorest countries, but it would remain just as expensive. Food safety is a very sensitive subject amongst the general public. The question of "Fuel or food" was hence asked in a way which was well-covered by the media: Is it ethically justifiable to cultivate rapeseed for biodiesel production or generally renewable commodities in Germany if this causes the supply of food to run short, agricultural prices to increase and hence, in the worst case, starvation elsewhere?

However, it is currently estimated that 3 to 5 percent of the globally produced and traded agricultural commodities are used for the production of biofuels. Many experts generally agree that biofuels are not jointly responsible for world hunger, but a number of causes must be considered which determine the local food supply in quantity and price. This is why food is cultivated in many developing countries (manioc, cassava) which is not traded on the international markets. Furthermore, the issue of property and availability of water is not solved in many countries or there are governments in power that neglect the needs, in particular of the rural areas. Unfortunately, in many poor regions of the world, it is the case that the rural population is currently threatened by poverty and starvation. The issue of security of supply is an important political issue and should therefore also be reflected in a responsible commitment of the industrial countries in the development aid based on this. "Poverty migrations" are increasing globally. However, politics is also powerless if hunger crises are the result of military conflicts.

Yet biofuels may currently be impulse generators for initiating new prospects in rural areas, as well as being a contribution to the local energy supply. With new crop types or those further developed by breeding, which are adapted

to the regional site conditions, land not used previously for arable crops could also be developed in these countries. Whilst the search for new fossil resources with immense investment costs is being pressed ahead with, the research for agriculture looks very meek, even though it should be clear to everyone that the fossil age is coming to an end, and that with new resources, time is merely being "bought".

It remains to be said that the discussion of biofuels and their significance regarding the influence on the international commodity supply and price development must be given special consideration, with a view to the required acceptance for politics and population. However, in terms of politics, the question arises as to which approaches have to take priority. Since the global market exhibits considerable surplus stocks despite biofuel production, the vegetable oil stocks are growing constantly, whilst the prices for commodities and foods are sinking. Additionally, British scientists have determined that around 2 billion tonnes of food is wasted globally; that is approximately 30 to 50 percent of global food. The causes are, among others, inefficient harvest methods, incorrect and bad storage and transport conditions, but also the purchasing and consumer behaviour. Shouldn't we focus on this first instead of putting biodiesel made of rapeseed or biofuels under general suspicion of being triggers for increasing or substantially fluctuating agricultural commodity prices and ultimately food prices. This political intervention would be concrete, contemporary and could create a better market supply at the same time. The industrial countries could render immediately effective support here. In short, with appropriate financially equipped support, a lot could be achieved straight away.

Biofuels are an important element for sustainable mobility

Under the German presidency, the European Union had decided in 2007 on the binding target for all member states that, from the year 2020, the volume of renewable energies in the transport sector must be at least 10 percent. This objective is now part of the so-called "energy revolution" in Germany and in the European Union. Politics thereby underlined its commitment to developing biofuels as a long-lasting and important pillar for achieving the climate protection targets and for fuel supply in the European Union. As a result, investments were made in the required biofuel production plants or in oil mills, and new jobs were created.

However, in Brussels, no target quantities in tonnes were arranged, but each member state must calculate what quantity of energy in the year 2020 corresponds to the consumed fossil fuel quantity (diesel, petrol) in the transport sector. So, at least 10 percent of these must come from renewable sources.

Around 210 million tonnes of diesel fuel are consumed in the EU. So how can the stated target be achieved? The member states must submit so-called plans of action to the European Commission, which show the national strategy and the biofuel quantities required for achieving the target. For diesel consumption, the table shows the biodiesel amount required for this according to the information of the respective member states.

In Germany and in the EU, around 5 or 21 million tonnes of production capacity was provided for the production of biodiesel. This capacity is therefore sufficient for reaching the energy target in 2020.

National Action Plans – Biodiesel Employment in the EU Transport Sector (millions of tons)

Year	2005	2010	2015	2020
Germany	1.873	2.42	3.255	5.184
Spain	0.17	1.716	2.53	3.616
France	0.382	2.526	2.77	3.325
Great Britain	0.06	1.004	2.136	2.872
Italy	0.209	1.012	1.603	2.193
The Netherlands	0	0.162	0.407	0.643
Czech Republic	0.003	0.225	0.405	0.577
Portugal	0	0.327	0.472	0.525
Finland	0	0.174	0.349	0.501
Austria	0.04	0.322	0.360	0.478
Total	2.737	10.723	13.452	19.914
EU 27 total	2.753	11.225	14.613	21.83

Source: Dutch Energy Research Center. ECN

This objective in turn resulted in the member states, particularly the mineral oil industry, being obligated to add certain minimum quantities of biofuels to traditional fossil fuels. However, the maximum quantity that may be added is not only a political, but also an engine-related matter that is agreed upon in so-called standardisation bodies at European level. Representatives of the vehicle, mineral oil and biofuel industry sit at a table. The result of these deliberations can now be seen on the filling pumps at petrol stations: E5, E10 and B7. According to the European diesel fuel standard - EN590 - diesel fuel may contain a maximum volume of 7 percent biodiesel and is approved by the vehicle manufacturers for old and new diesel vehicles.

But where does biodiesel come from? – only from the European Union? Due to the liberalisation policy as the result of agricultural reforms for oil seeds (rapeseed, soya, sunflowers) and vegetable oils (palm oil, among others), the EU has not been an inaccessible market for a long time. This observation also includes biodiesel as a fuel. Investors who have erected production plants in the European Union must also take this fact into account. Commodity or biofuel production and marketing are in an international competition. However, the incentive effect is great, especially in terms of supplying the European market with commodities or biofuels. The obligatory stated target signalises a safe minimum level to the economic operators, so to speak. As expected, the policy questioned whether this triggers the expansion of commodity cultivation in Asia (palm oil) as well as in South and North America (soya oil) at the expense of regions required for nature and climate protection, such as the rainforest.

In this respect, that's why the European parliament and the council of ministers had agreed with the directive proposed by the Commission "For proposing the use of energy from renewable sources (2009/28/EC) - in short: Renewable Energies Directive" in June 2009 and the new "laws of the game" embedded within it to which all players - and that is the special feature - must keep even in third countries outside of the EU. An influence on the agricultural raw material production of soya, sugar cane and palm oil plantations of this type in Asia as well as South and North America, which is trend-setting and practically legally consolidated over night, is the first of its kind.

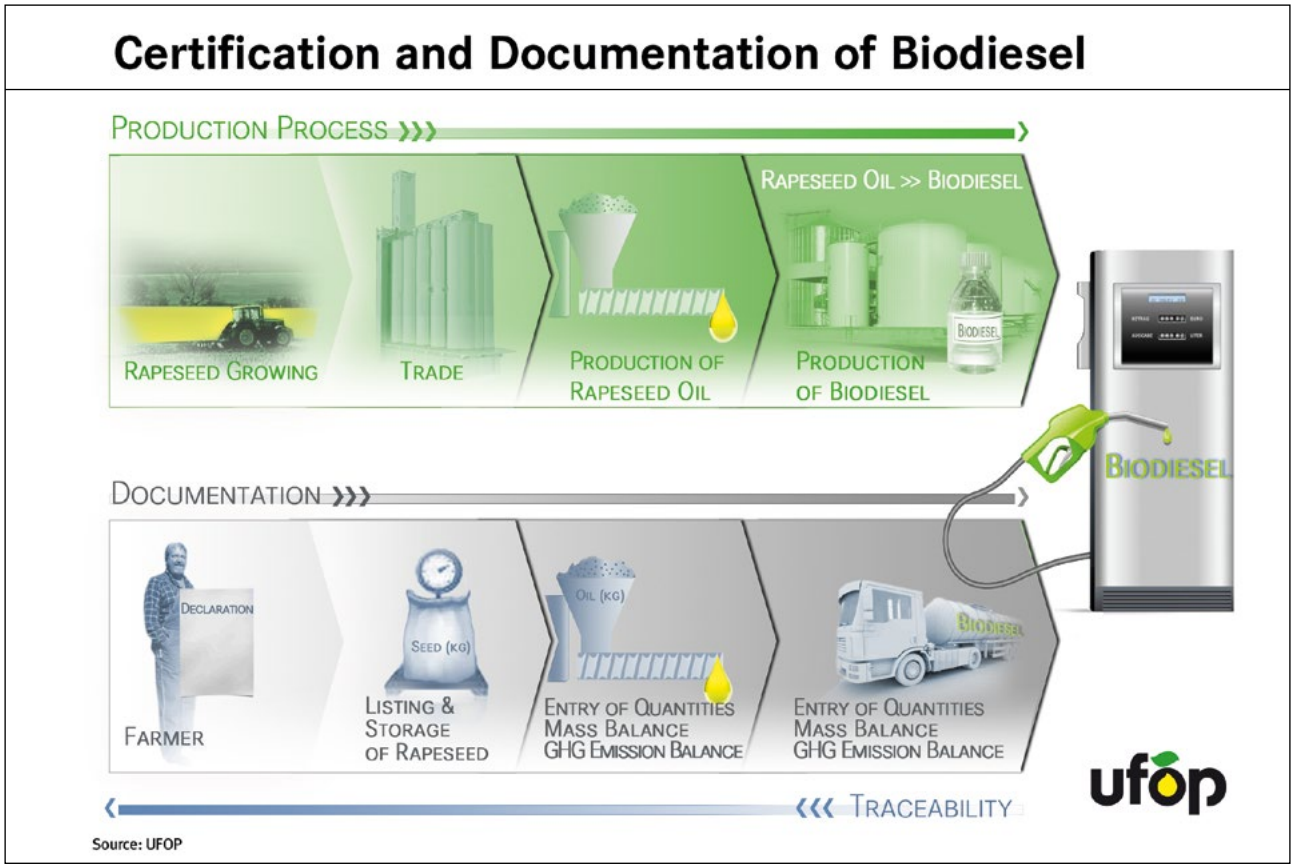
Agricultural production and sustainability – biofuels are leading the way

The special feature of these "laws of the game" is the fact that they must be implemented with immediate effect as a prerequisite for market access into the EU.

These laws of the game include requirements for a sustainably oriented agricultural commodity production. The focus is on the following question: From what land do the commodities originate? For this verification, the EU Commission has approved so-called certification systems, which include certain indicators for checking compliance with the sustainability requirements on site in the commodity countries. This particularly includes the verification that the biomass commodities, such as soya, palm oil or even rapeseed, may not originate from land that was created through deforestation and used for planting soya or palm oil plantations, for example, after 1st January 2008. Using this date, the policy wanted to ensure that only services used before this date were used for cultivating commodities and producing fuels. In doing this, the Commission had correctly taken into account that the land used up to now is detected using modern satellite technology and hence is practically taking stock. This type of "monitoring" has already been state-of-the-art for European agriculture for years.

Furthermore, starting with commodity cultivation up to it its final use, it must be verified that the greenhouse gas reduction accompanying the use of biofuel is currently at least 35 percent and from 2017 at least 50 percent compared to fossil fuel. These requirements are certified so that eventually the origins and the greenhouse gas reduction, for example, are recorded for biofuels that are consumed in Germany and attributable to the obligation for introducing admixtures through the responsible German Bundesbehörde der Bundesanstalt für Landwirtschaft und Ernährung (BLE). The BLE writes an annual report as a result of the evaluation regarding the origins of the biofuel quantities to be entered into their database by the biofuel producers and traders. Therefore, a transparent documentation system was created which will hopefully also be introduced or taken up in other member states with respect to its documentation quality. The individual elements (see fig. on the right) of the certification chain intertwine, beginning with the commodity cultivation up to the processing in the oil mill and production of the biodiesel. At the end of the verification chain, a document – a sustainability verification – is created which enables the marketer to sell this fuel amount to the mineral oil industry, so that this can in turn be attributable to this quantity of the obligation for introducing admixtures on the basis of a certified biofuel With this environmental objective, the EU Commission has since approved 13 certification systems.

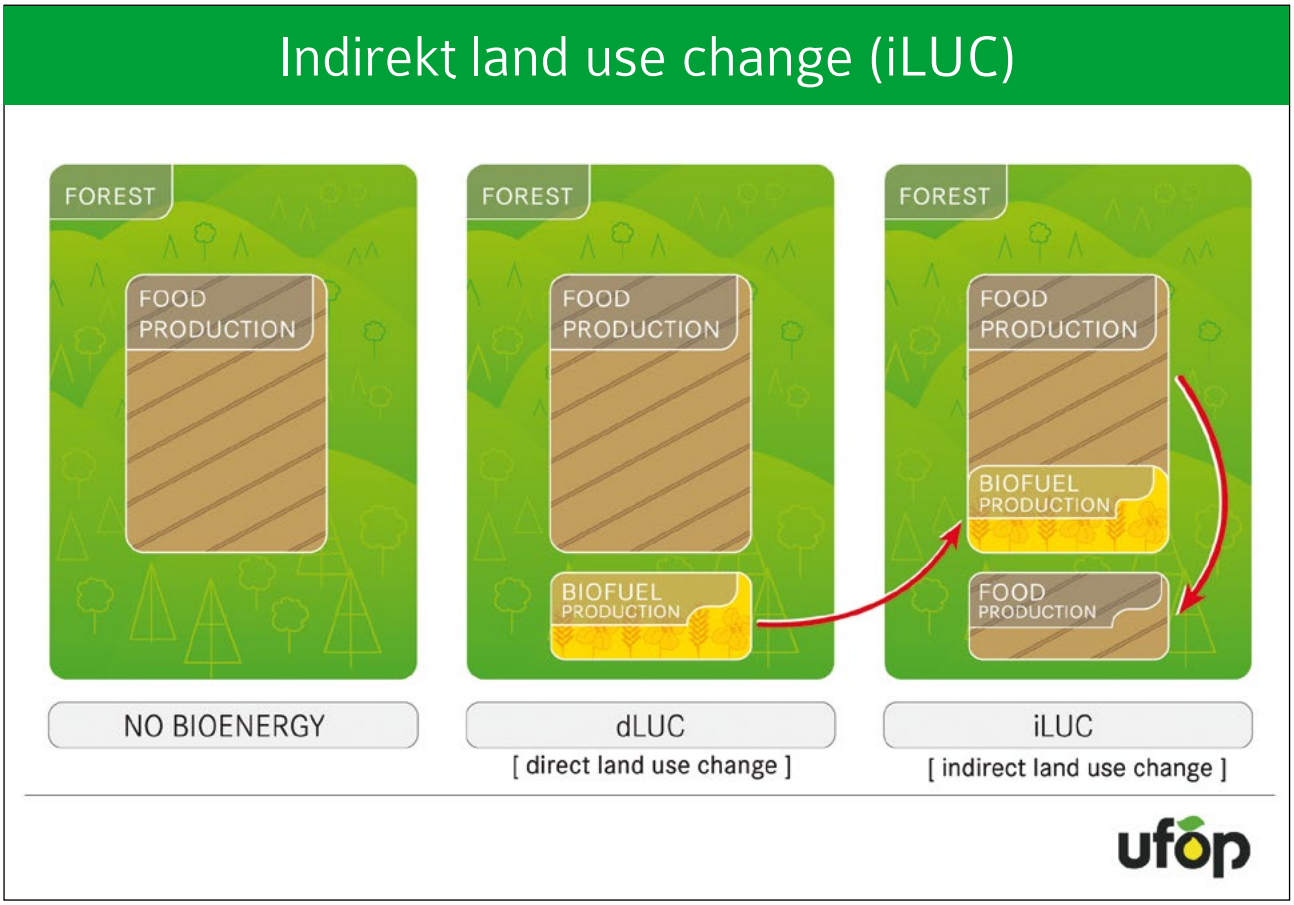
The EU has therefore established international requirement criteria and certification systems for the first time which eventually have to be further developed in terms of a learning experience. This is because these certifications also provide requirements for social standards. The objective specified by the Renewable Energy Directive for the transport sector therefore creates a production incentive, but one which subjects the market access into the European Union to the reservation that minimum standards are to be ensured in the form of testing criteria and "checklists" for the market participants, including the biomass commodity producers and traders. Naturally, there is great fear that a new enormous bureaucratic burden will accompany this and fraud cases will not be excluded. This is why particularly the certification systems must quickly eradicate any possible weaknesses



and qualify the certification bodies correspondingly. Experiences with the practical implementation already confirm that not only environmental organisations critically follow the implementation, particularly in third countries (Asia, South America), but also the market players themselves critically evaluate the certification systems with respect to the documentation request and implementation quality, especially if a competitive disadvantage has to be feared. This critically associated "observation process" is desired and necessary for improving the test criteria and the "on-site inspection" within the framework of the practical implementation of the certification.

Indirect land use changes and greenhouse gas balance – what contribution does rapeseed make?

Naturally, the question arises that if rapeseed is cultivated in Germany for biodiesel production, the corresponding rapeseed oil quantity in the global market is lacking for use in food or market supply. The conclusion is clear that for the balance of requirements, additional land would have to be cultivated or cleared in Asia in the worst case. On this newly created land, e.g. palm oil plantations, the vegetable oil quantity could be produced in order to balance out the lacking rapeseed oil amount that was used as a result of the EU biofuel policy for the production of biodiesel. However, additional greenhouse gas emissions are formed on this new cultivated land, which then have to be attributed to the biodiesel made from rapeseed as "causer" for the deforestation, for example. These can even be very high if the forest areas are cleared. Large quantities of greenhouse gas are particularly set free over years through humus depletion when using peat land. This effect is known as "Indirect Land Use Change" (iLUC). The EU Commission instructed various scientific institutes in order to verify the connection between what extent land would additionally have to be cultivated and what quantity of greenhouse gases will be emitted from these areas if the EU target value of 10 percent of renewable energies in the transport sector was achieved. A cause-effect relationship could not be verified. The reason for this is very complex connections to the international agricultural markets and the low amount of commodities for biofuel production of approx. 3 to 5 percent. This is why the EU Commission had initially suggested having this "iLUC phenomenon" further investigated by scientists. This matter is and remains the subject of the environmental debate. Here it is overlooked that biodiesel may no longer be attributed to reaching the target in the EU in the case of sanctioning biodiesel by way of introducing an extra premium system as an additional greenhouse gas surcharge (iLUC factor = 55 gCO_2/MJ), and the European biodiesel production is at the brink of failure, but this sanctioning of the European oil seed producers and the biodiesel industry is ineffective. The fact is that in Asia and South America, the deforestation is continuing unimpaired because, unfortunately, there are also countries in the world that are not practically interested in a sustainability certification, but would like to import vegetable oil at as cheap a price as possible. The introduction of a sustainability certificate,



which is also binding in third countries, provides the option of influencing the framework condition for the cultivation of commodities and the social standards for the farm worker immediately. Furthermore, the European Union must also be active short-term in solving these environmental matters by way of bilateral negotiations.

Yet questions which will determine the current trading fields of future resource and energy supply related orientation are linked with the rapeseed cultivation in Germany or in the EU for the production of biofuels. In this field of discussion, the rapeseed must of course also prove for its energetic use that a noticeable contribution can eventually be made to environmental protection with the cultivation, processing and use – in other words that the ecological or CO_2-balance is as positive as possible.

The rapeseed must therefore also play off its ecological advantages in conjunction with its economic advantages. Rapeseed has a high "preceding crop effect" since it:

- extends the crop rotation in corn rotations as a so-called leaf crop,
- enriches the humus content in the soil with its residues after the harvest
- its tap root takes nutrients from deeper ground layers than cereals,
- prevents soil erosion – covers the soil after sowing in August up to the harvest in July of the following year,
- leaves behind a good soil condition and thereby reduces the effort for the soil cultivation for the subsequent crop.

Extensive scientific examinations confirm that the preceding crop effect of rapeseed is proven in the rotation yields for winter wheat. If winter wheat is cultivated after rapeseed instead of winter wheat after winter wheat, the wheat yield after rapeseed is on average 10 percent higher, whilst the fertiliser application for the wheat is lower at the same time. For a cultivated land of 1 million hectares of rapeseed for biodiesel production, this corresponds to an additional wheat yield of around 0.7 million tonnes contingent on a preceding crop effect. The rapeseed is therefore not required for breaking up the crop rotation for ecological reasons, but causes an additional wheat yield anyway. The preceding crop effect also contributes to lowering the aforementioned "iLUC effect". A question not only discussed intensively in expert groups, but also in the policy, is: how good is the greenhouse gas balance of rapeseed for biodiesel production and which factors have to be discussed in the calculation?

The legal regulation for the recognition of biofuels within the framework of sustainability certification requires, as described above, that biofuels must prove to have a green-

house gas advantage over fossil fuel of currently at least 35 percent and at least 50 percent from the year 2017: Can the rapeseed even meet this requirement in 2017, or is the greenhouse gas saving even higher?

An attempt to answer this basic question was also made using the European Directive for promoting renewable energies for biofuels. This also requires the method for calculating the greenhouse gas value of the respective biofuel types (bioethanol, biodiesel...) on the basis of the respective biomass commodities (rapeseed, soya, sunflowers, wheat, sugar cane etc.). The problem is that the crop types are compared with each other, but preceding crop effects and hence the higher yield for the crop after rapeseed are not considered. Crop type specific advantages, such as preceding crop effects (see above), therefore remain unconsidered.

Particularly criticised or discussed is the matter of the consideration of the rapeseed meal accumulating in rapeseed processing. The quantity balance for Germany is currently as follows:

1 million hectares of rapeseed cultivation for biodiesel production

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Yield: approx. 3.8 million tonnes of rapeseed

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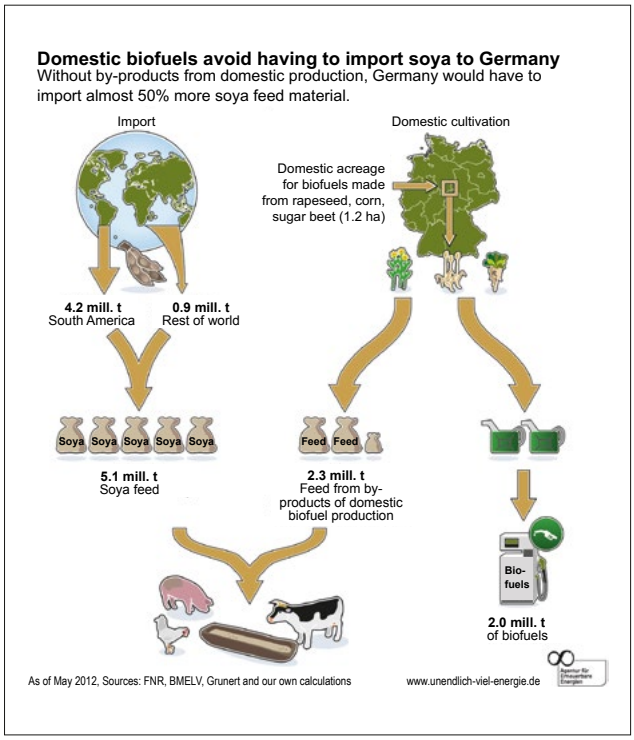
approx. 1.5 million tonnes of biodiesel
approx. 2.28 million tonnes of rapeseed meal

Through extensive feeding trials, it could be proven that rapeseed extraction meal can fully replace soya meal for the feeding of cows, oxen and fattening bulls. Rapeseed extraction meal as a protein supplier can also be added to the mixed feed as a component in pig feed (fattening pigs, sows and piglets). The cultivation of 1 million hectares of rapeseed and the accompanying production of 2.28 million tonnes of rapeseed extraction meal corresponds in turn to a cultivated land of around 1 million hectares of soya cultivation in order to produce an equivalent amount of soya meal.

Commodity foodstuffs could be cultivated on this land instead. This ancillary effect also applies to commodities such as corn and sugar beets. For rapeseed, it is therefore clear that the openly discussed argument of fuel or food can be solved. The formula must therefore be: "Fuel and food" is possible. the Institute for Energy and Environment (ifeu), Heidelberg, had already calculated the greenhouse gas reduction potential from rapeseed in biodiesel in 2003. This study considered such things as the preceding crop effect.

Result: For every litre of biodiesel, 2.2 kg of CO_2 are saved. 1 litre of biodiesel corresponds to a release of 2.65 kg of



CO_2. Consequently, there is a saving potential with biodiesel of around 80 percent in consideration of all direct and indirect effects (preceding crop effect, rapeseed meal use in animal nutrition, release of cultivated areas for soya). At this stage, it must also be noted that high-quality glycerine is produced for the pharmaceutical industry when producing biodiesel. That is around 10 percent of biodiesel production: Approx. 250,000 tonnes in Germany in 2012.

Conclusion: Rapeseed is the ideal crop type for extending crop rotations in Germany and in the European Union. Rapeseed opens up a range of utilisation opportunities and final uses as a commodity source in the food and feed industry, but also for energetic and material use. Rapeseed makes a substantial contribution to climate and resource protection.

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