



IENICA



Interactive European Network for Industrial Crops and their Applications

Newsletter number 7

March 1999

Sixth Symposium on Renewable Resources for the Chemical Industry, 23 - 25 March 1999, Bonn, Germany

The IENICA project will be represented at the conference with the website on-line. Please pay us a visit, Melvyn Askew and Sarah Hugo will be pleased to meet you.

Thank you

The coordinator would like to thank Sophie Labrousse, IENICA representative in France, for her contribution to the IENICA project over the past year, she has left to pursue a new post - we wish her well. Sophie's replacement is Magali Rocher, also at ADEME and we welcome her to the project. Contact Magali at magali.rocher@ademe.fr.

IENICA would also like to thank Lars Dahlgren IENICA representative in Sweden for his contribution to IENICA for the last two years. We welcome Mr Johan Berg of the Swedish Farmers Supply and Crop Marketing Association (SLR) who will replace Lars. Contact Johan at johan.berg@slr.se

HRH Duke of Kent visits the IENICA website



His Royal Highness the Duke of Kent visited the Central Science Laboratory on 25th February 1999. Melvyn Askew gave the Duke a tour of IENICA's display of industrial crops, the Duke then had a look at the IENICA website. The Duke was accompanied by a number of landowners and farmers from the North Yorkshire region.

Guidelines for Good Agricultural Practice (G.A.P.) of Medicinal and Aromatic Plants

The guidelines for the Good Agricultural Practice of Medicinal and Aromatic (Culinary) herbs are intended to apply to the growing and primary processing of all such plants traded and used in the European Union. Hence they apply to the production of all plant materials used in the food, feed, medicinal, flavouring and perfume industries. They also apply to all methods of production including organic production in accordance with the European regulations. The final version of this document was released on 5 August 1998 by the European Herb Growers and Producers Association (EUROPAM).

The guidelines are described under the headings seeds and propagation material; cultivation; harvest; primary processing; packaging; storage and transport; equipment; personnel and facilities; documentation; education and quality assurance.

A main aim of the guidelines is to ensure that the plant raw material meets the demands of the consumer, and as such the standards of the highest quality. Especially important aspects are that they are produced hygienically, in order to reduce microbiological load to a minimum, and produced with care, so that the negative impacts affecting plants during cultivation, processing and storage can be limited,

All participants of the production process from primary producers to traders are required to comply with these guidelines voluntarily and to elaborate practical measures in order to realize them. Producers, traders and processors of medicinal and aromatic plants, especially of tea-like products and herbal medicinal products, should comply with the GAP Guidelines document by batch documentation and demand that their partners also meet these requirements.

The complete document is available on the IENICA website on the Contacts/Speciality Chemicals page.

For further information contact James Lambe, President of EUROPAM, BP 235, 43 Boulevard des Tilleuls, 04102, Manosque Cedex, France.

Forthcoming Industrial Crops Events

4 - 7 May 1999

Agrobalt

Agriculture, Food Processing, Packaging and Foodstuffs.

Vilnius, Lithuania

Contact: IFWexpo Heidelberg GmbH

Fax: + 49 (0) 6221 18 14 38 to request details.

27 - 28 May 1999

Natural Fibres Performance Forum: An IENICA seminar

Copenhagen, Denmark

A two-day conference addressing issues crucial to the increased future use of high performance plant fibres in industrial products.

Contact: <http://www.vanhauen.dk/ienica9910.htm>

Tel: + 45 3314 0050

Fax: + 45 3314 5750

E-mail: ss@vanhauen.dk

2 - 5 June 1999

Energy and Agriculture towards the Third Millennium

An International Conference sponsored by the European Commission.

Athens, Greece

Contact: Professor George Papadakis

Tel: + 30 1 529 4209

Fax: + 30 1 529 4023

Email: gpap@auadec.aua.gr

10 - 11 June 1999

Freisinger Tage 1999- Prospects for Plant Proteins in Foods

Munich Airport Marriott Hotel, Freising, Germany.

Contact: Fraunhofer-Institut für Verfahrenstechnik und Verpackung IVV

Tel: + 49 (0) 81 61 4 91 1 24

Fax: + 49 (0) 81 61 4 91 2 22

Email: gabler@ivvv.fhg.de

Close of registration 21st May 1999.

24 June 1999

The Industrial Applications of Bioplastics

Bonn, Germany

Contact: Mrs B. Pullens de Witt

Europoint BV

Tel: + 31 30 6933489

Fax: + 31 30 6917394

Email: info@europoint-bv.com

For comprehensive details of events see the IENICA web site: www.csl.gov.uk/ienica

or contact Sarah Hugo at s.hugo@csl.gov.uk

Prospects for Lubricants Based on Renewable Resources

Development of the lubricants market towards eco-friendly formulations has occurred unevenly, and depended on applications and the countries involved. The work described here aims to identify the difficulties the market is confronted with, and the channels to exploit in order to guarantee development of natural based lubricants.

The European lubricant market, whatever the lubricant origins, reached in 1997 4,958 Mt. The substitution of 20% of the present European lubricant consumption (about 1 Mt.) by natural based lubricants, would correspond to about 20 % of the total area of rapeseed and sunflower grown in West Europe.

The biolubricants market at the beginning of the nineties, saw an improvement in the range of products and expansion into oleochemical esters, and technical performance became a clear priority. At the European level, natural based lubricants currently represent around 2% of the market, with Germany, Austria and Sweden using the largest volumes proportional to their total consumption.

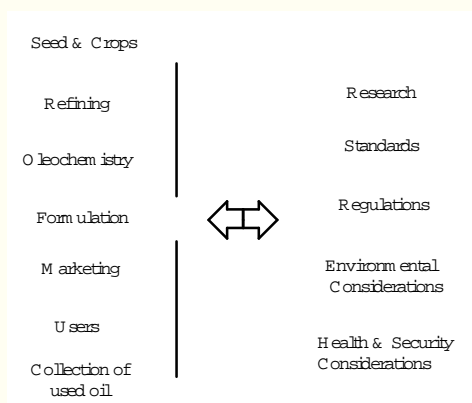


Figure 1 : Active areas involved in the lubricant chain

The agro-industry has a crucial role in the improvement of vegetable oils for non food applications. The selection of varieties and developments in biotechnology, enabled development of new varieties of oilseed plants providing oils rich in erucic, oleic or lauric acids. In particular high content of oleic acid improves the thermal stability and oxidative resistance of final products. Vegetable oil can be used either directly in formulation with an antioxidant at temperatures not above 70°C, or in the form of modified oils (eg polymerised). However, for optimal lubrication, vegetable oil should be subject to further chemical modification.

To obtain the desired oleochemical esters, the following transformations are required :

- ~ an alteration of the triglyceride structure where glycerol is replaced by a more resistant polyol such as isosorbitol or neopentylpolyols, including pentaerythritol (PE), trimethylolpropane (TMP) or neopentylglycol (NPG).
- ~ an alteration of the hydrocarbon chain by the reaction of OZONOLYSIS leading to short esters after combination with an alcohol. For example, OZONOLYSIS reactions of oleic acid provides pelargonic acid (C9) and azelaic acid (diC9). In the same way, erucic acid leads to pelargonic acid and to brassylic acid (diC13).

The various combinations of fatty acid/alcohol/esters lead to different categories of esterified compounds.

Vegetable esters are excellent lubricants due to their natural properties of anti-wear and withstanding extreme-pressure, they therefore contribute to good performance of equipment. Additional assets are increased thermal stability and favourable viscosity index and pour point. An extended lifetime for the lubricant as well as a reduced consumption are other advantages resulting from the use of natural esters.

- ~ Natural anti-wear properties
- ~ Good solubility of additives in natural bases
- ~ Absence of deposits linked to cooking phenomenon
- ~ Protection against corrosion
- ~ High biodegradability
- ~ Absence of ecotoxicity
- ~ Absence of toxicity

Figure 2 : Major features of natural lubricants

Additives have developed along the same lines as the base oils, ie towards increased performances, and biological innocuousness. Companies like PCAS, Lubrizol and Rhein Chemie work in this field.

The use of naturally based formulations with a high biodegradability and a low ecotoxicity is particularly desirable:

Base oil	Primary biodegradability (CEC)
Mineral oil	10 - 30 %
Polyaoléfine (PAO)	20 -80 %
Synthetic Esters	70 - 90 %
Oleochemical Esters	> 90 %
Rapeseed oil	> 95 %

Table 1: Primary biodegradability for the main lubricant bases

The substitution of mineral oils with vegetable formulations has the following advantages:

- ~ the reduction of water and ground pollution,
- ~ the minimisation of health impact (occupational diseases listed by the International Labour Office). In France for instance, these diseases represent between 1 and 2% of the total occupational diseases, corresponding to an average of 7025 days each year lost by temporary disablement.

Lost oils are lubricants which can not be recovered and generate pollution and toxic effects to life. These lost oils represent more than 10% of the total consumption in lubricants. These are typically chain saw oils, remoulding oils, two stroke engine oils, railway oils, oils for transport (pneumatic and sliding systems, compressors), industrial greases, anti-dust oils.

Hazardous applications mean occasional losses mainly caused by leaks or circuit breaking. Hydraulic fluids, 4 stroke engine oils, metal working fluids, gear oils belonging to this category.

In France, these applications correspond to about 250,000 tons of lubricants entering the environment uncontrolled. Collection devices can only slightly reduce this figure. The nature of the oil is therefore of paramount importance; natural based lubricants can provide the answer for most applications.

The cost of natural based lubricants is higher than for conventional lubricants, but it should not be considered as a hindrance. Firstly, the increase in marketed volumes should reduce the purchase price in the future and secondly, the actual profitability of lubricants should be assessed globally.

- ~ the purchase price of the product,
- ~ the dilution of the products/the necessary applied amounts,
- ~ the life duration of the equipment, the cost of the maintenance operations,
- ~ the life of the lubricant, the cost of fluid removal, the frequency of drains/washing,
- ~ the cost of treatment of used fluids,
- ~ the annual amount of taxes and insurance,
- ~ improvement of working conditions.

Figure 3 : Parameters linked to the choice of lubricants

Ultimately, environmental advantages in the short, medium and long term can balance the difference in cost. Moreover, the choice of a biolubricant contributes to the company public image (ISO 14000), and with it the possibility of conquering new markets.

In several industry sectors there are successful examples of the use of natural lubricants:

Forestry, Scandinavian countries widely use natural based lubricants as chain saw oil and hydraulic fluid. Since 1991, Austria has a regulation forbidding the use

of non-biodegradable chain saw oil, as well as the use of some categories of additives. In France, following preliminary tests, companies are ready to go forth within the framework of the ISO 14000 environmental standard.

Construction, invited bids include an eco-compatibility clause for remoulding oils, in some local areas in Germany. In the north of France, companies continue to use the natural mould release agents they had tested within "green building sites".

Generally most building material manufacturers have considered the possibility of using a lubricant which provides better working conditions for the employees. In this case, the French sickness benefit has reserved reduced contributions for these companies.

French Railway transport is interested in biodegradable greases for lubrication of the lines and switches. Tests have been performed and biodegradable esters are primarily used for switches. Improvements regarding the application methods and the working conditions have been performed at the same time.

Aeronautics, vegetable based working fluids have already been adopted in combination with micro-pulverisation technology for milling work. This technology strongly helps to reduce the volume of used fluids, and also to improve the cleanliness of the working posts.

Automobile industry, increasingly severe anti-pollution European standards (Auto-oil program) make the engine particularly demanding regarding lubrication - oleochemical esters can provide the answer here, as observed with the increasing interest from car manufacturers. Other advantages linked to the introduction of esters in engine oil are drain spacing, energy saving and reduced PAH release. To get their products approved in engine lubrication, the ester producers associate with car manufacturers, for example the NYCO company and FINA group.

Food industry, the use of vegetable bases to grease production equipment or for cutting or remoulding operations is clearly justified, as risk of food contamination must be eliminated. In Europe there are no regulations, although the HACCP approach (Hazard Analysis Critical Control point) is increasingly being used.

In spite of this progress which shows increasing awareness, an appropriate strategy is needed to convince users of lubricants.

The conditions needed to ensure successful development of the biolubricant market are:

~ to overcome resistance to change and ignorance of the products,

~ to set a favourable framework for the development of the biolubricant market, through concrete measures (incitements, regulations).

To this end the following measures are suggested:

~ to demonstrate the technical and economic feasibility and communicate the results,
~ to implement testing and promotion campaigns, to bring to light the assets of these types of products,
~ to make clear the selection criteria for eco-compatible oils (suitable standards).

This approach is being experimented in the three following fields in France :

~ in forestry with the chain saw oils, hydraulic fluids, two stroke engine oils and greases,
~ in construction, with mould release agents for concrete and remoulding oils for ceramics,
~ in the food industry, a preliminary audit is planned, before tests commence.

Transformers, formulators, distributors, equipment manufacturers, professional organisations, technical centres and ADEME are all willing to cooperate.

As long as European regulations are not in force, an approach reliant on quality of lubricants, but not calling for artificial subsidies, would be judicious.

Mr J.P. Gaouyer and Mr E. Poitrat from ADEME as well as Mr Sylvain Claude from ONIDOL are warmly thanked for their support and their valuable contribution.

Commissioned for IENICA by Sophie Labrousse.
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