



Non-Food Crops: From Agriculture to Industry - International South European Symposium

Bologna University was host to the IENICA Symposium for Southern Europe in May, focusing on regional developments and opportunities for industrial crops and creating a forum for international collaboration. The Symposium attracted over 100 delegates, with sessions covering dyes and colourants, natural fibres, industrial oils and green chemistry. Keynote speakers included Melvyn Askew, co-ordinator of the IENICA project, and Sandro Palmieri, Section Director of the Research Institute for Industrial Crops in Bologna. The speaker presentations from the conference, and some posters, are available on the IENICA website (www.ienica.net). Gianpietro Venturi, organiser of the conference and



Harvesting Giant Reed (Arundo donax L.)

Source: P. Venturi & W. Huisman

Head of the Department of Agro-environmental Sciences and Technologies (DiSTA) at Bologna University, opened the symposium and welcomed all delegates to Italy. In his opening address Professor Venturi stressed the need for more research in the industrial crops field and to disseminate this information to pull down the barriers to development, through conferences such as this. Melvyn Askew reinforced this view in his outline of the IENICA project, which seeks to create synergy within the EU industrial crops industry and facilitate interaction and



Source: Dr. Stefano Panconesi

interchange of information, through the organisation of technology transfer conferences and seminars such as this.

Sandro Palmieri suggested that new technology is improving and benefiting the industry. Green chemistry, for example, is helping to develop new and improved crops, and bio-refining and new extraction technologies can add value by generating many products. The 'reverse micelles' extraction technique, for example, can obtain glucosinolates, oils, proteins, bio-active peptides etc. from crambe seed.

Graziano Ceddia, of the Central Science Laboratory in the UK, also presented a keynote paper and discussed the potential for industrial crops to manage on-farm risk. He has found that where the diversity of farm enterprises is increased (i.e. by incorporating industrial cropping) the variability of the farmers' income is decreased. This allows the farm system to withstand variability, provides insurance against risk and is a step towards agricultural sustainability.

In his keynote paper, Guido Reinhard of the Institute for Energy and Environmental Research in Germany, warned that 'green' products are not necessarily synonymous with 'environmentally friendly'. Life Cycle Analysis (LCA) can be used to assess the overall impact of a material, and biobased products may have negative implications. LCA of hydraulic oil from rapeseed, for example, as opposed to crude oil, may show positive contributions in terms of the greenhouse effect and energy demand but disadvantages for acidification, eutrophication and ozone depletion.

The first focussed session covered dyes and

colourants. Whilst the environmental benefits of natural dyes were stressed it was noted that the range of natural colours is limited and consistency of the final product is difficult to achieve (although this variability can also be considered desirable).

Natural fibres were discussed over two specialist sessions and included papers on hemp, flax and kenaf, as well as market-focussed presentations on the textile, automotive and building industries and papers on many aspects of the production chain, including harvesting, pretreatment and storage. Maria Talarczyk, from the Institute of Natural Fibres in Poland, outlined the main applications for lignocellulosic fibrous raw materials as being in textiles, pulp and paper, composites, fine chemicals and energy, and suggested that more attention should be given to health and comfort features, biodegradability and eco-response and social repercussions, especially in rural areas. Mrs Talarczyk also outlined the work looking at the production of 'biosilk': precisely specified polymers produced using the molecular structure of spider silk. Some research has looked into using genetically modified goats to produce milk rich in spider silk proteins that can be spun into fibre, and other work, in Europe, has used genetically modified potatoes in a similar way. Additionally, it was noted that bast fibre plants can also provide valuable by-products, for use as pharmaceuticals, cosmetics etc. and the plants themselves can be valuable in cleaning up heavy metals from polluted soils.

Claudio Botta described the work of the Italian Hemp Consortium, which aims to exploit and revive hemp cultivation in Italy. It looks at agronomy and harvesting, and the economic profitability for farms and manufacturing companies, and has succeeded in increasing the area of hemp from 50 hectares in 2001 to nearly 1000 hectares in 2003. In Autumn 2003 a plant for hemp processing will begin operations and the next steps are to widen and consolidate the hemp chain from niche to industrial production.



Brassica juncea: high erucic acid
Source: F. Zanetti

The specialist session on industrial oils covered a range of oil crops, including sunflower, rapeseed and Brassica spp., and looked at both the agronomic and

industrial aspects of oilseeds. The properties of the 'perfect' vegetable oil for industry were discussed by Paolo Bondioli, of the Stazione Sperimentale per le Industrie degli Oli e dei Grassi, and not only should they be completely biodegradable, they must also be cheap, readily available, a liquid down to -50°C and resistant to oxidation, hydrolysis and heating. It was recognised that this combination of characteristics is impossible to achieve and so the final destination for the material must be fully understood, to produce a 'tailor-made' product which fulfils specific requirements.

The potential for erucic acid cultivation in Southern Europe was discussed and, whilst a number of Brassica spp. offer a high erucic acid yield, problems exist in terms of temperature needs, low adaptability to different environments, cross pollination, breeding difficulties and the absence of many specific and selective herbicides. The introduction of Brassicaceae in S. Europe therefore depends upon knowledge of the cultivation environment and plant needs, but does provide an interesting opportunity.

The final specialist session of the symposium focussed on green chemistry and included overviews of the cosmetics and pharmaceutical sectors, plant protection and essential oils. Marco Versari discussed Novamont's starch-based bioplastics - Mater-Bi, which include complexed, destructured, and thermoplastically processable starch. Applications for the materials include tyres, films, foams, injection moulding etc., for use in composting, packaging, hygiene, agriculture, catering etc.

The symposium proved to be extremely successful and our thanks go particularly to Gianpietro Venturi for organising such an interesting and enjoyable programme and conference. We are also very grateful to the local organising committee, the scientific committee and the staff of Avenue media for all of their hard work, as well as all speakers and delegates. Visit www.ienica.net to view the conference proceedings.

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INFORM - A pioneering project giving the first strategic information gateway to recent European industrial successes in the Renewable Raw Materials (RRM) sector

Background

In early 2000 the European Renewable Resources &

Visit the IENICA website at: www.ienica.net

Materials Association (ERRMA) submitted a proposal under the Fifth Framework Programme (FP5) for a Concerted Action. The concept was for an Industry Network for Renewable Resources & Materials (INFORMM). After evaluation and selection by the Commission it was combined with the complementary IENICA project to become one of two workstreams in the INFORMM-IENICA project. INFORMM began on 1st April 2001 as a two-year project. It was conceived to provide the first strategic information gateway to further aid data access across the RRM sector. INFORMM was the first RRM project, to be funded by the European Commission, to provide the opportunity for a commercial-style review of the whole sector and develop a new technique to 'future proof' best practice in ICT (Information and Communication Technology). The five ERRMA partner countries, Belgium, France, Germany, the Netherlands and the UK, joined the first wave of INFORMM. The project has been coordinated by ACTIN, the UK representative organisation, with Dr Nigel Oliver as Project Leader.

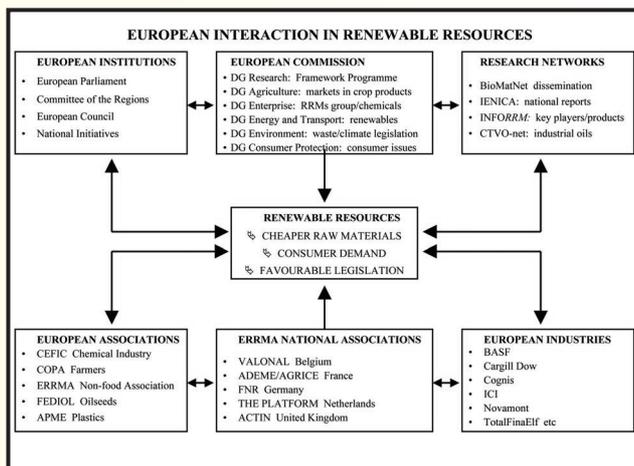


Figure 1.

There is a vast range of activities and websites managed by various organisations and Associations at the regional, national and EU-wide level, covering the RRM sector from different perspectives (see Figure 1- from www.industrialcrops.eu.com). Data held by these were not integrated nor was it easy to search across them for information on a specific topic. Indeed, they present a complex and therefore uninviting scenario to any prospective "data miner", such as a commercial company seeking to start a business initiative in this area and looking for marketing or technical data.

Achievements

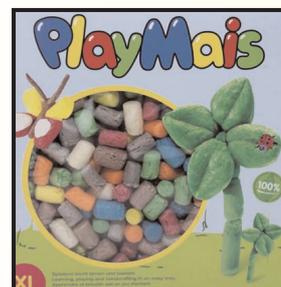
Directory of key players

This has been published electronically and is known as the 'INFORMM 100'. The partners identified a selection of key players within their countries and submitted details such as location, business type, competencies and products in a standard data entry

format. Concise profiles of these key activities and organisations form the core of the directory. These data are now published on the INFORMM website (www.informm.com) with "Smart-tags" added to enable full search facility by crop/product/sector etc. An electronic pro-forma has also been developed to enable further 'self-submissions' in the future. Thus it is hoped to build and maintain a growing bank of information which will be automatically updated.

Case Studies

Individual Cases were selected from each of the five participating countries to cover the spectrum of successful activity within the country. An independent Rapporteur was appointed to work closely with each partner and with ERRMA to secure the co-operation of industry. The Cases, taken together, illustrate by example how new products based on RRM have already reached the market place. From the experience gained by visiting each company and interviewing the technical and marketing staff concerned the Rapporteur created an electronic template to standardise data entry. This can now be used for self-submission of further Cases. An analytical framework emerged which shows common trends in commercial enterprises embarking on RRM projects. Whilst each case is unique in its specific Strengths, Weaknesses, Opportunities and Threats, as the portfolio of Cases grows certain generic features keep appearing. These underlying features, such as lack of raw material technical data for industrial specification, help decision-makers at national and EC level to focus R&D resources on areas critical to industry. An example Case Study is illustrated with the product Playmais® by Hubert Loick GmbH. This wonderfully simple and creative toy is produced from foamed, extruded maize grit and food colourings. It not only provides children with safe and stimulating play but is teaching tomorrow's consumers about the environmental benefits of RRM whilst they enjoy themselves.



Playmais® by Hubert Loick GmbH

XML data handling

The data management and analysis system was developed by Pira International and allows users to access the INFORMM Directory of key players and Case Studies in a variety of ways. These can range from simple browsing, through to detailed searching for specific data or 'data-mining' to compile maps, charts or summary matrices. INFORMM was one of

the first EC projects to utilise XML (Extensible Markup Language), which should accelerate the acquiring, managing, publishing and transmitting of data on RRM's and the companies involved in them.

Conclusions

INFORMM and ERRMA have demonstrated the viability of using RRM as a feedstock by citing specific examples of successes in the form of Case Studies. These are published on the web and can be browsed or searched by keyword. The functionality of the data system has been demonstrated at pilot level, but the full usefulness will only be apparent when sufficient data are loaded to give statistical robustness to any trends and patterns. The project has demonstrated that XML is a powerful tool for 'data-mining'. Common use of the XML language will reduce the proliferation of different websites using incompatible languages. These make data exchange difficult and this in turn leads to unnecessary duplication of development effort across the EU.

The Future

The information held by INFORMM, such as the 112 Directory Entries, is now freely available through the website in unrestricted form. It will be disseminated as widely as possible electronically. INFORMM was only ever a pilot project and restricted to a limited number of organisations within only five countries. With such limited data it is therefore not possible to 'landscape' the total European RRM activity at this stage. However, the methodology has been proven to work well and, given the resources to support further data gathering and maintenance, a robust model can now be built. This will provide a useful service to everyone concerned with RRM and the land-use and human resource implications of scaling-up enterprises within a region.

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Alternative Agriculture in the Mountain Regions of Bulgaria

The programme for Alternative Agriculture in the mountain regions of Bulgaria started in 2003 and includes plant cultivation and stock farming. Its aim is the creation of effective agriculture for the sustainable development of mountain regions through the restoration of traditional, and the re-creation of alternative, agriculture, for the enhancement of employment and incomes. There are a number of reasons for the development of this programme:

- The high level of unemployment in the region as a result of closing down some mining, industrial and agrarian activities
- Agriculture in the mountains is on small, fragmented fields, with low fertility

- Agriculture is currently largely based on two crops - potatoes and tobacco
- Low yields as a result of irregular crop rotation and difficulties connected with realisation of production.

The Alternative Agriculture programme provides labour employment and additional income to the populations of the mountain regions. Suitable crop rotations in the areas currently occupied with tobacco and potatoes will increase the yield and effectiveness of production. The introduction of some industrial crops, and the new use of poor and stony soils on steep and eroded grounds, provide for higher effectiveness and has an anti-erosion effect. Orientation towards ecological products according to the requirements of the EC will guarantee their market realisation.

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Forthcoming Industrial Crops Events

5-6 November 2003

The Rothamsted International BioMarket-BioProducts from Plants and Microbes

Rothamstead, Harpenden, UK

Tel: 0044 (0)1582 763133

Email: biomarket@bbsrc.ac.uk

website: www.bioproduct.info

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