

IENICA

Interactive European Network for Industrial Crops and their Applications

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REPORT FROM THE STATE OF AUSTRIA

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METHODOLOGY

This report was prepared from various information sources:

- The Austrian national statistic for agriculture for the year 1999, 2000, 2001, 2002
- Information from the chambers of Agriculture of Lower- and Upper Austria
- The Austrian Starch Industry
- The Ministry of Agriculture, Forestry, Environment and Water Management
- Waldland Company (Fibre production)

EXECUTIVE SUMMARY

Compared with the first national report on the production of industrial crops in Austria for IENICA in January 1999, the further development between 1999 and 2002 was rather slow and disappointing. The industry does not really stimulate the farming community to try new pathways in plant production for industrial purposes. The open, world-wide supply of raw plant materials and the low price levels do not favour the set up of a domestic supply chain. Moreover, the financial possibilities to use set-aside land for the production of renewable resources and industrial crops are not really accepted. From approximately 100,000 hectares of set-aside land in Austria only 9.2-12.4% are utilised for non-food crops.

Oil crops

From the figures given, rapeseed biofuel production comprises more than three quarters of the set-aside land used for non-food crops. There is an increase in sunflower oil production on set-aside land (from 689 hectares in 1999 to 2,318 hectares in 2002) for pharmaceutical and chemical products. All other non-food oil crops (safflower, linseed, mild thistle, sesame) declined sharply in the period 1999-2002.

Fibre crops

The fibre crop production has nearly ceased completely. Only about 500 hectares are grown and the only spinning plant which remains is additionally supplied by foreign raw material. The attempt to start a new fibre production line with new stinging nettle varieties (*Urtica dioica L.*) did not find new sponsors after the end of a promising EU-project.

Carbohydrates

Carbohydrates in the form of starch products are manufactured exclusively from potato and maize sources. The quota for potato starch remained stable; the non-food starch for the domestic market raised from about 51,000 in 1999 to 70,000 tonnes in the 2002.

Speciality crops, herbs and medical plants

In the promising field of non-traditional and innovative plant production a lot of small activities could be discovered. The lack of exact data from the production areas of about 35 different plant species did not enable any conclusion about the development in Austria within the period observed. Only for 2002 the first exact area data for these plant groups could be discovered (see Table 3).

INTRODUCTION

The agricultural plant production of crops used as renewable resources for industrial non-food purposes in Austria is based on the EC-regulation 1251/1999 (establishing a support system for producers of certain arable crops) and controlled and performed by the EC-implementations EC 2316/1999 and EC 2461/1999. At the end of 2002 a task force consisting of members of the various Federal Institutions and research groups from the Vienna University of Natural Resources and Life Sciences published a document about the state of the art situation in the field of renewable resources and the capacity for it in the near future.

Taking the development of the areas for industrial (non-food) crops and crops for biofuel from 1999-2002 (Table 1) it can be demonstrated that the possibilities to use set-aside land for this production segment is only sparsely used. Thus, a differentiation of the compensation fees into a payment for green fallow or a subsidy for renewable resources does not seem to be very sensible. The market mechanisms should regulate these proportions on set-aside land.

More problems are forecast for the future about the utilisation of pastures and alpine meadows. Based on the tendency to increase the yearly milk production per cow up to 2008, 250,000-400,000 hectares of non-intensive grassland will be set-aside. For this closing down of agricultural land, no EC-subsidies are granted. This situation is a strong disadvantage for renewable crops.

To avoid future re-forestation in tourist-preferred alpine areas, a subsidy for industrial crops on former pasture land should be introduced. The dimension of this payment could be adjusted upon the profitability of the crop and/or the efficiency of mother cow rearing in those areas. All present proposals of the GAP will not lead to stimulated new markets for renewable resources or industrial non-food crops.

OILSEED CROPS

Oilseed rape, sunflower, oil seed pumpkins, and poppy are still the main oilseed crops produced in Austria. About a further 40 oil-bearing species are under investigation, but there is no novelty for commercialisation to report in the near future.

Oilseed Rape

The figure in Table 2 show us no substantial change in the cultivation area of oilseed rape, which varies between 51,000 and 55,000 hectares and is mainly used for edible oil production. There is a tendency of increase of oilseed production rape production on set-aside land from 7,630 in the year 1999 up to 9,771 hectares in 2002. Remarkable are the rather low yield levels of around 2.5 tonnes per hectare compared with figures from other EC countries. About 85% of the oilseed production is used for biodiesel, on average 8,300 tonnes, which is about 2% of the gasoil consumption in Austria. The amount of 1,500 tonnes is used for non-energetic purposes such as oil-based lubricants, hydraulic fluids, lubricants in agricultural machinery and timber harvesting equipment. There is a demand for plant oil based printing ink and coating products, but this is tackled by imports from Germany.

Sunflower

Where the total area for sunflower cultivation in Austria decreased from 24,000 ha (1999) to 21,400 ha (2002), the cultivation area for non-food use of sunflower oil on set-aside land increased more than 3 times – from 689 ha in 1999 to 2,318 ha in 2002 (see Table 1). Among the 20 cultivars - all of them of foreign origin - which are at present registered on the national list, only 4 of them carry the high oleic acid character. About half of the sunflower oil from set-aside land is used for biodiesel, the other half of about 2,000 tonnes is utilised in the chemical and pharmaceutical industry.

Other Oilseed Crops

The low price level of the oil market for various plant oils such as from safflower, linseed, milk thistle, sesame etc. forced the oil manufacturing industry to buy on the foreign market. Thus the demand for the domestic market dropped sharply, as demonstrated in Table 2 from 8,000 hectares

in 1999 to nearly half the area of 4,200 in 2002. Literally none of these oil-bearing plants were grown on set-aside land as shown in Table 1.

Summarising the situation in this field of industrial oil crops for non-food, non energy uses it should be mentioned that there is a well established market of about 1.2 million litres oil for greasing chain saws. As a future potential market, the overall need for lubrication material in Austria - particularly for the water protection alpine areas with special environmental regulations - is in the range between 90,000 to 100,000 tonnes per year and could be easily covered by plant oils. Another prospective market to be more developed is the market for printing ink. At present about 22,000 tonnes per year are used, but only 12,000 are produced from the domestic supply.

The Austrian company VIALIT GmbH replaced in the bituminous surface paste the binding agent gasoil or benzine with rapeseed oil. The whole refurbishing procedure for the repairs of asphalt roads after the winter season can be performed in the future without any quality losses with this new mixture. The abrasion of the asphalt is then more environmentally friendly and biodegradable.

FIBRE CROPS

In comparison with other nations within the EU, in Austria a flax and hemp industry could not be established here. The reason for this are insufficient harvesting and processing techniques and the poor quality of the raw material found in the domestic production. Investigations in Denmark, France and Germany found that focused federal and country research & development initiatives resulted in significant innovations in the field of fibre concentrations, optimised harvesting techniques and further improved product developments. To support these achievements, suitable legal and favourable conditions are programmed. In Denmark, for example, ecological insulation materials are subsidised and promoted as alternative products for the building industry. In Austria only an industry sponsored research of a few enterprises with German institutions is present. These cooperations develop new applications for both fibre plants, such as insulation material, geotextiles, fibre-reinforced concrete, fibre-reinforced polymers, paper production and energy use. More support for natural fibres will offer their advantages for new industrial applications compared with the common glass-fibre used everywhere.

In Austria flax is used for coarse linen and manufactured in the spinning plant of Rastefeld, Waldland Company, Lower Austria (175 ha in 2002, see Table 2). About 280 ha of hemp was grown for seeds which were dehulled and then converted into breakfast muesli additives. The remaining 50 ha of hemp was spun into yarn for ropes. The latter mentioned production has a very restricted market, whereas the flax production could be enlarged, but the farmers are not interested as the cultivation risks are too high.

Since the end of 2001 the Austrian Institute for Agrobiotechnology in Tulln (Head Prof. P. Ruckebauer) has tried to continue the very successful first introduction steps to establish a fibre-nettle production in Austria (1999-2001 EU programme FAIR-CT98-9615: NETTLE-reintroduction of stinging nettle cultivation as a sustainable raw material for the production of fibre and cellulose). Based on breeding results from new crossing populations of stinging nettles (*Urtica dioica L.*) out of central European collections a genetic foundation material for improved fibre content and spinning quality was established. Many efforts were undertaken to receive financial supports for its continuation, but failed so far. There is a great demand of the Italian textile industry, but no raw material for the spinning industry is available at present. Imports from China did by far not meet the quality requirements of the European textile manufacturers.

CARBOHYDRATE CROPS

Potato Starch

In the national list of varieties 6 cultivars are documented for their exclusive use to produce starch. The figures for the annual contracting and the starch production in the period 1999-2002 are as follows:

| | 1999 | 2000 | 2001 | 2002 |
|-----------------------|--------|--------|--------|--------|
| Area (ha) | 6,700 | 6,600 | 6,600 | 6,000 |
| Starch (tonnes) | 43,900 | 48,100 | 43,600 | 40,200 |
| EU-quota ¹ | 49,100 | 48,400 | 47,700 | 47,600 |

This type of starch is produced only by one company, the AGRANA-Beteiligungsgesellschaft in the plant in Gmünd/Lower Austria, which has a capacity of about 250,000 tonnes of starch potatoes per year. The average starch content varies between 17.9-19.6% depending on harvesting figures and growing conditions provided.

Maize Starch

The production of maize starch is not regulated by the EU. In 1996 the capacity of the only maize starch plant in Austria in Aschach/Upper Austria has been doubled, so up to 800 tonnes of maize can be converted into approximately 520 tonnes of starch per day. The production figures are as follows:

| | 1999 | 2000 | 2001 | 2002 |
|--------------------------------|---------|---------|---------|-----------------------|
| Maize | 194,000 | 211,000 | 231,000 | 266,000 |
| Starch | 128,300 | 139,500 | 152,700 | 175,000 |
| Used for non-food applications | 51,200 | 55,800 | 61,080 | 70,360 (estimated) |

Starch used for technical applications represents about 40% of the total domestic production. These amounts vary between 52,000-76,000 tonnes annually and are used in the paper industry, the corrugated board industry and in diverse textile applications. The market demand cannot be covered by the domestic production and about 15% of the demand must be imported.

HERBS AND MEDICAL PLANTS

The Austrian market with regard to plant species used for pharmaceutical and related uses (teas, flowers, spices) is not transparent enough to produce exact statistical data. The areas of this production sector grow rather slowly and are mostly placed in farms performing organic agriculture (1999: 1,089 hectares, 2001: 1,142, 2002: 1,379). The first evaluation of field areas was made in 2002 (see Table 3).

In the last three years a rising tendency of market demands can be observed in organically produced tea plants and seed spices, particularly for the Italian market. The stable price conditions favour a future outlook in this special field of plant production.

New research initiatives for pharmaceutical products from grassland plant species:

Within the frame of a research project of the Institute Joanneum in Graz/Styria the grassland herb *Plantago ssp.* was found of new medical importance. The dried leaves contain mucilage, rubber, resin and have applications in the form of teas, syrups or candies against inflammations of mouth and throat disease. Now further useful ingredients such as tannins, the mustard oil Sulphoraphen and the glycosides Aucubin and Catalpol were detected. These combined substances enhance the healing process after injuries and have an anti-rheumatic effect.

Red clover (*Trifolium pratense L.*) is harvested during flowering as a whole plant or only the heads are collected. The former medical effects against rheumatic disease are now restrained in favour of the various phytoestrogens found in this leguminous plant. The evaluation of epidemiological data of patients showed very positive effects of a phytoestrogen-rich nutrition against chronic diseases such as osteoporosis, cardio-vascular and hormone derived cancer diseases. Concerning gynaecological applications it could be proved that red-clover extracts are a potential substrate to cure post-menstruate disorders.

¹ EU-Quota – The amount of production which is negotiated with the European Commission and subsidised.

Table 1

Area of Renewable Resources for Industrial Purposes
On Set-Aside Land in Austria, 1999-2002

| (Hectares) | 1999 | 2000 | 2001 | 2002 |
|-----------------------------|----------------|----------------|----------------|----------------|
| Set-Aside Proportion | 10% | 10% | 10% | 10 % |
| Hemp (not for textiles) | -- | 12 | 141 | -- |
| Timothe grass | 47 | 20 | -- | -- |
| Wheat | 10 | 20 | 122 | 303 |
| Barley | -- | -- | 3 | 17 |
| Corn (Maize) | 165 | 211 | 418 | 401 |
| Peas | 3 | 3 | 22 | 3 |
| Camelina | -- | -- | 4 | 8 |
| Sunflower (oil) | 689 | 929 | 2,275 | 2,318 |
| Linseed (oil) | -- | -- | -- | 3 |
| Castor Bean | -- | -- | 3 | -- |
| Rye (only pollen) | 2 | -- | 3 | -- |
| Chamomile | 2 | -- | -- | -- |
| St. Johns Wort | 239 | 292 | 133 | 24 |
| Rapeseed (Biofuel) | 7,630 | 6,095 | 8,652 | 9,771 |
| Biogas – Non-cereals | -- | -- | 1 | 119 |
| Biogas – Cereals | -- | -- | 67 | 2 |
| Biogas – Maize | -- | -- | 10 | 68 |
| TOTAL | 8,787 | 7,582 | 11,854 | 13,037 |
| Set-Aside Land Total | 106,366 | 107,030 | 104,824 | 104,471 |

Table 2

Area of cultivation and yield of industrial crops in Austria, 1999–2002

| | 1999 | 2000 | 2001 | 2002 |
|--|-----------|-----------|-----------|-----------|
| Oilseed Rape | | | | |
| Total/hectare | 64,775 | 51,334 | 55,811 | 55,038 |
| Yield t/ha | 2.97 | 2.34 | 2.62 | 2.33 |
| Total Production (tonnes) | 192,381 | 120,121 | 146,224 | 128,238 |
| Area on set-aside land (for industrial purposes only) | 7,630 | 6,095 | 8,652 | 9,771 |
| Sunflower | | | | |
| Total/hectare | 24,244 | 22,336 | 20,324 | 21,381 |
| Yield t/ha | 2.64 | 2.46 | 2.49 | 2.73 |
| Total Production (tonnes) | 64,004 | 54,946 | 50,606 | 58,370 |
| Area on set-aside land | 689 | 929 | 2,275 | 2,318 |
| Other Oil Crops | | | | |
| Total/hectare (Safflower, Linseed, Milk-Thistle, Sesame) | 8,027 | 7,866 | 5,504 | 4,219 |
| Fibre Flax | | | | |
| Total/hectare | 336 | 452 | 141 | 175 |
| Raw fibre yield t/ha | 3.70 | 2.90 | 4.50 | 4.00 |
| Production (raw fibre, tonnes) | 1,243 | 1,310 | 635 | 700 |
| Hemp | | | | |
| Total/hectare | 289 | 288 | 907 | 327 |
| yield t/ha | 2.50 | 2.70 | 6.00 | 3.50 |
| Production (raw fibre, tonnes) | 723 | 778 | 5,442 | 1,145 |
| Corn (Maize) | | | | |
| Total/hectare | 152,541 | 164,057 | 171,420 | 172,230 |
| yield t/ha | 9.60 | 9.86 | 9.09 | 9.98 |
| Production (tonnes) | 1,464,394 | 1,617,602 | 1,558,207 | 1,718,855 |
| Potatoes (Starch) | | | | |
| Total/hectare | 10,851 | 10,527 | 10,092 | 9,460 |
| Contract area | 6,600 | 6,600 | 6,600 | 6,600 |
| yield t/ha | 34.20 | 36.93 | 35.99 | 36.06 |
| Total Production (tonnes) | 371,104 | 388,762 | 363,211 | 341,128 |

Table 3

**Overview about areas and market forecasts of herbs and medical plants in
Austria, 2002**

| Production branches | Species | Area In hectares | Market forecasts |
|--------------------------------|-------------------|---------------------------------|-----------------------------|
| Tea plant | Peppermint | | ++ |
| | Common balm | | ++ |
| | Common mallow | | ++ |
| | Stinging nettle | | + |
| | Sage | | + |
| | St. John`s wort | | - |
| | Total: 320 | | |
| Flowers | Marigold | | - |
| | Cornflower | | - |
| | Common mallow | | |
| Total: 5 | | | |
| Spices (plants) | Parsley | | +++ |
| | Thyme | | ++ |
| | Marjoram | | ++ |
| | Fennel | | ++ |
| Total: 104 | | | |
| Spices (seeds) | Mustard | | + |
| | Caraway | | +++ |
| | Fennel | | ++ |
| | Aniseed | | ++ |
| Total: 950 | | | |
| Total | | 1379 | |

Market forecasts: + stable, ++ raising, +++ high demands- falling market