

IENICA

Interactive European Network for Industrial Crops and their Applications

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REPORT FROM THE REPUBLIC OF IRELAND

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Ireland

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METHODOLOGY

The following organisations and individuals were contacted for the preparation of this report:

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 - Dr Jim Crowley,
 - Dr Jim Burke
- Foliage Ireland
- Dunboyne, Herb Production Ltd.
- Atlantic Aromatics, Various Perfumeries, Gaelic Athletic Association

EXECUTIVE SUMMARY

Interest in non-food crop production has been limited in Ireland with little expansion since 1999. Unlike most other EU countries, Irish agriculture is still dominated by grass-animal enterprises, with less than 10% of agricultural land devoted to arable crops. Therefore, set-aside area remains relatively small and mainly in permanent grassland.

The main non-food crop option in Ireland is focused on crop production for processed board use. There are also some small-scale enterprises including herb production for medicinal purposes, hurley making from ash tress, lemon balm production, charcoal production from alder and various 'exotic' foliage for the cut-flower market.

Of the non-energy industrial crop uses, the most promising appears to be *Miscanthus* and hemp for fibre- or insulating- board production. Their high yield, low dry matter and ease of establishment are useful advantages. *Miscanthus* productivity trials have been conducted for more than 10 years in Ireland but as yet there are few commercial outlets for the product.

Introduction

The main focus of non-food and industrial crops in Ireland since the compilation of the initial IENICA report has been on energy crops, and in particular on *Miscanthus*. There continues to be small scale activity in speciality crops, such as herb and foliage production, ash for ‘hurleys’ (similar to hockey sticks) for use in the game of hurling and lemon balm production all of which are predominantly centered on the Irish market. Due to the overwhelming dominance of grass-animal enterprise in Irish agriculture the extent of available area for industrial crops remains small. However, industrial crops could provide enhanced or alternative employment in rural Ireland if suitable applications could be identified through further research. The previous report suggested that hemp for fibre board production was the most promising use of non-food industrial crops for Ireland but as yet there has not been any move to establish it as an industry.

Current Land Use

Of the 7 million hectare area of Ireland, 4.4 million hectares (70%) was devoted to agriculture in 2000 (census year), the majority of which was grass. Virtually all agricultural production is for food processing or animal feed purposes, with no industrial uses being reported by the national statistics office at this time. Since 1998 the total land area used for growing cereals has remained at approximately 280,000 ha, with the proportion under the various cereals changing annually (Table 1). Yields of cereals have varied since 1998, and 2002 was on average the worst yielding year over the four year period (Table 2).

Table 1 - Areas of various cereal crops, 1999-2003 ('000 ha)

Year	1999	2000	2001	2002	2003
Winter wheat	40.7	58.8	49.9	80.0	
Spring wheat	27.5	19.2	35.0	22.7	
Winter barley	26.2	24.1	19.2	23.2	
Spring barley	165.8	158.2	162.4	152.8	
Winter oats	7.7	9.6	5.7	11.8	
Spring oats	12.5	7.2	11.1	7.0	
Total area	280.4	277.1	283.3	297.5	

Source: Central Statistics Office

Table 2 - Yield of various cereal crops, 1999-2003 (average yield, t/ha)

Year	1999	2000	2001	2002	2003
Winter wheat	9.4	9.9	9.8	8.8	
Spring wheat	7.8	8.1	8.0	7.2	
Winter barley	7.6	8.4	8.0	6.6	
Spring barley	6.5	7.0	6.9	5.3	
Winter oats	7.8	8.3	8.0	7.8	
Spring oats	6.1	6.5	6.6	5.9	

Source: Central Statistics Office

Arable Set-Aside

Arable set-aside land has increased by more than 10,000 ha since 1999 (Table 3); at least some of this land has potential for non-food crop production. However, this land is often in very small holdings and largely fragmented leaving it difficult to manage on an industrial scale. Of the area under set-aside, two-thirds is estimated to be permanent grassland and unlikely to be available for non-food crops due to the emphasis on grass-livestock agriculture. In order to exploit the area under set-aside for non-food crop production it will be necessary to provide farmers with profitable crops that can be grown on a relatively small scale. In order to provide security to farmers for the continuous availability of set-aside land it will be necessary to comply with the requirements and regulations controlling the area to be set-aside.

Table 3: Set-aside area in Ireland, 1999-2003 ('000 ha)

Year	Set-aside area
1999	30,567
2000	29,617
2001	37,887
2002	41,517
2003	41,965

Source: Department of Agriculture and Food

At present, there is no commercial production of short rotation willow coppice or *Miscanthus* in Ireland. The total area of land which is currently set-aside in Ireland would be suitable for *Miscanthus* and Short Rotation Willow coppice production (Walsh, 1999). However, the uncertainty of future set-aside levels leads to a reluctance among farmers to make the long term (approximately 20 year) commitment required for the production of these crops. It seems more

likely that set-aside land would be used for the production of oilseed rape while non set-aside agricultural land in the area of a conversion plant would be used for *Miscanthus* or Short Rotation Coppice production.

***Cannabis sativa* - for fibre**

Trials were conducted at Oak Park, Crop Research Centre, from 1996-1999 to evaluate the commercial value of whole hemp stems in the manufacture of medium-density fibreboard (MDF). It was established that hemp could be grown on any mineral soil in Ireland with an average yield of 12.5 t ha⁻¹ and an average height of 2 m. In processing, it is necessary to separate the long bast fibres from the shorter hurd fibres. The industry uses approximately 2 million tonnes of wood at present. Replacing even 10% (200,000 tonnes) of this figure with whole hemp stems would create a market for over 6,000 ha of hemp. This would not only increase the level of available raw materials for the MDF industry but would make available a very useful break crop to the tillage sector.

The hemp straw produced at Oak Park was baled and later chopped. The chopped material was mixed with wood chips at a ratio of 1:7.7 (13%) on a dry matter basis and incorporated into a Medium Density Fibreboard (MDF) manufacturing process. The resulting MDF board passed all quality tests. On the basis of these results the industrial experts were satisfied that hemp could replace up to 20% of wood chips in their process.

Harvesting hemp proved difficult with conventional farm harvesting equipment. The loose long bast fibres also caused damage to machinery in the manufacturing process. It has been suggested (Crowley, 2001) that the development of the hemp crop as an industrial raw material will require the development of harvesting, chopping and storage techniques that can cope with the height, bulk and fibrous nature of the crop.

***Miscanthus* – for fibre**

Model predictions suggest that *Miscanthus* yield in Ireland ranges from 16 t ha⁻¹ in the north east of the country to a maximum of 26 t ha⁻¹ in the south west (Clifton-Brown *et al.*, 2000). Rainfall in Ireland is not limiting to yield but the length of the frost free period will determine the length of the growing season and so will account for some of the inter-annual variation in yield.

The use of *Miscanthus* for MDF production has been investigated but the results were not published. However, the conclusions were that it could be used in the production of fibreboard but like hemp could not compete with forest waste as a cheaper raw material source.

The following table gives a summary of the potential uses of *Miscanthus* in Ireland. More research is required to further develop the technologies required to process the *Miscanthus*, to select new varieties and to ensure markets for the various products.

Table 4: Potential uses of *Miscanthus* in Ireland

Use	Brief description
Construction/building material Light natural sandwich material (LNS) Building blocks and panel boards Medium density fibre-board (MDF) Particle boards*	<i>Miscanthus</i> has been recognised for its strength and low weight for construction purposes. Various grades of fibreboards can be used for a wide range of applications, from insulation (LNS) to panneling. More research in development of varieties with better quality stems is required.
Thatching	<i>Miscanthus sinensis</i> is more suitable for thatching than <i>M. giganteus</i> as the stems are smaller and thinner.
Composting	<i>Miscanthus</i> compost could be used as an effective fertiliser but problems have occurred with high concentrations of cadmium and chromium.
Bioremediation	<i>Miscanthus</i> may be established on contaminated land to reduce the environmental impact. Studies to date in the UK and Portugal showed reduced growth on land contaminated with heavy metals. But it may be possible to use the crop as an energy source.
Paper production	The high cellulose content of <i>Miscanthus</i> renders it suitable for paper production.
Fermentable products	<i>Miscanthus</i> may be used as a raw material for the production of fermentable pentose sugar solution.
Fertiliser	<i>Miscanthus</i> ash from combustion may have a use as fertiliser.

*Plywood substitute made of coarse sawdust that is mixed with resin and pressed into sheets. Used for closet shelving, etc.

Source: Visser and Pignatelli, 2001.

Other Enterprises

Due to the overwhelming dominance of grass-animal enterprise in Irish agriculture industrial crops are grown on a very small scale and are usually speciality crops. Non-food crop enterprises include herb growing for medicinal purposes, hurley making from ash tress, lemon balm production, charcoal production from alder and various 'exotic' foliage for the cut-flower market. There is a small herb farm (10 ha) producing herbs for medicinal purposes in the north east of the country. Hurling is the Irish national sport and hurley are used, similar to hockey sticks to play the game. The hurleys are made from ash but the wood is generally weak and therefore they need to be replaced several times during the playing season. Promotion of ash growing by farmers is currently under way to aid farm income.

Trials of lemon balm production, for oil, were carried out in south-west Cork. The climatic conditions, warm and wet, were perfect for growth but the enterprise failed due to competition from cheaper import prices. There are two fields of lavender grown near Dublin but on investigation it was discovered that it was for promotional use only and was not harvested for essential oil. It has transpired that the Irish climate is not conducive to essential oil production. As far back as 1937, investigations into 'oils from Irish grown plants' reported that very little information was available in Ireland and the most essential oils were imported. Camelina has been grown successfully in Ireland for bio-diesel but could also be used for cosmetics and paint if more research was conducted.

Foliage Ireland grow various exotic species of plant including 20 ha of eucalyptus and provide foliage especially for the cut flower industry.

Conclusions

At present, the most promising non-energy industrial crops appear to be *Miscanthus* and hemp for fibreboard production. The high yield, low dry matter and ease of establishment are useful advantages. Demand will be dependant on the rate of expansion of the fibre board industry in relation to the availability of forest thinnings and saw-milling wastes. Currently forest waste is commercially more viable than either *Miscanthus* or hemp, for MDF production. However, due to the versatility of *Miscanthus* we envisage that with more research there is great potential to exploit a wide range of non-food applications from this crop. Speciality crops such as herb production are grown on a small scale and possibilities for industrial application is limited at present.

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