

- ▶ The EU market for cut flowers and foliage is €12 billion.
- ▶ Naturalness is an increasing requirement in the foliage sector, leading to increased demand for forest foliage.
- ▶ A COFORD study has shown that foliage has the greatest market potential of all non-wood forest products sector in Ireland.
- ▶ Irish growing conditions are highly suited to the growth of a range of forest foliage.

## Forest foliage

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Forest foliage refers to decorative plant material collected from trees, shrubs or ground vegetation found in the forest. Most people are familiar with forest foliage through the use of pine, fir, holly and ivy in the manufacture of Christmas floral arrangements. Along with these traditional items, the forest provides a wide range of other interesting foliage.



### The Irish cut foliage industry

Currently the EU market for cut flowers and foliage is €12 billion, of which foliage accounts for 8-10% (Collier et al. 2004). The influence of fashion permeates the industry, with a constant need for new, innovative ideas. The current trend for all things natural has resulted in a demand for foliage from wild and woodland species (Kelly and Whelton 2004).

The production of foliage from many tree and shrub species represents a new emerging industry ideally suited to the Irish climate. A COFORD study, *Markets for Non-Wood Products*, showed that foliage had the most market potential of the six categories of non-wood forest products reviewed (Collier et al. 2004). The emerging industry includes a number of companies, based mainly in Kerry and Wexford. A co-ordinating group, Foliage Ireland, comprises the main development agencies, including COFORD, Teagasc and Enterprise Ireland, as well as company representatives.

To further develop cut foliage production from forests, COFORD is funding a project: *Management, screening and evaluation of a range of forest trees and associated ornamental species for suitability as cut foliage*. The main objectives of the project are:

- to determine the optimum regime for managing a range of conifer species for foliage production.

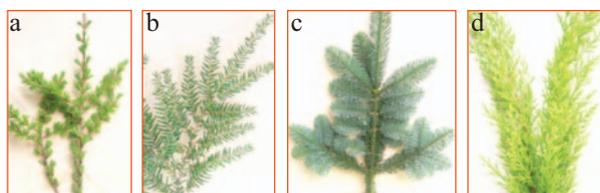
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- to evaluate and screen a range of forest and associated ornamentals that might have potential in the cut foliage trade.

## Management and evaluation of a range of forest tree species for use as cut foliage

The project is examining the foliage potential of four forest tree species: Japanese larch (*Larix kaempferi*), Monterey cypress Goldcrest (*Cupressus macrocarpa* Goldcrest), noble fir (*Abies procera*) and western hemlock (*Tsuga heterophylla*). Trials have been established in plantations of various ages, on a range of sites (Table 1).

The possibility of a dual purpose (foliage and timber production) management system is being examined for western hemlock, Monterey cypress (Goldcrest) and Japanese larch. An appropriate number of final crop trees have been selected at each site, and the premise that trees removed in thinning operations might be used for cut foliage production was explored. In addition three pruning treatments and a control have been superimposed in each crop.



▲ Species included in the trial were (a) Japanese larch, (b) western hemlock, (c) noble fir and (d) Monterey cypress (Goldcrest).

Table 1: Site descriptions.

SPECIES	LOCATION	AGE	HEALTH STATUS	TRIAL COMMENCED
Japanese larch	Foulksmills, Co Wexford	4	Very vigorous growth. Trees are fully furnished with well-developed branch work.	May 2005
Monterey cypress (Goldcrest)	Foulksmills, Co Wexford	4	Same site as larch trial, less uniformity and vigour to date.	June 2005
Western hemlock	Clogheen, Co Tipperary	6	Poor site. Bark stripping by deer evident throughout the plantation.	January 2006
Noble fir	Brosna, Co Kerry	10	Originally a Christmas tree plantation. Prior to thinning the crop had begun to close canopy, with many lower branches shedding needles. Otherwise vigorous growth with plenty of suitable foliage available.	March 2006

Treatments imposed were different for each species. As an example, treatments carried out in the Japanese larch site crop are outlined in Table 2. Previous research has established that the way foliage is graded and presented is critical for profitable production (Kelly 1997). Consequently, foliage grades specific to each species were identified, and yields were measured in each case. Height and diameter measurements have been taken to determine the effect of foliage removal on tree growth.

As noble fir is not generally regarded as a timber producer in Ireland, the experimental layout differs from the other species examined. A range of treatments was imposed to examine the optimum way of managing overmature Christmas tree plantations for cut foliage production.

Early results, one growing season after removal, indicate that height and diameter growth are not immediately influenced by foliage harvesting in Japanese larch and Monterey cypress (Goldcrest). Further results are needed to confirm this observation. Foliage yields (Figures 1 and 2), and recovery rates are good for both species, with foliage yields from Monterey cypress Goldcrest increasing dramatically after initial harvesting. Development of lateral shoots in Japanese larch after foliage harvesting is shown in Figure 3. Data from the other species will be available in due course.

Given that little or no information exists on best ways to remove graded foliage stems from commercial forest species, the following tentative recommendations for production of forest foliage from the species examined are offered by the project team:

Table 2: Treatments investigated in Japanese larch trials.

Treatment	Description
T1	Control
T2	Remove 55 cm foliage stems from all trees in plot.
T3	Prune final crop trees, cut top off foliage trees at 2.3 m and remove 55 cm foliage stems.
T4	Prune final crop trees, scar foliage trees and remove 55 cm foliage stems.

- It appears that foliage harvesting at the levels examined in the project had no significant effect on either height or diameter growth of either Japanese larch or Monterey cypress (Goldcrest). It appears that harvesting saleable foliage stems from lateral branches will not affect tree growth. This, however, needs to be verified by further analysis and at least another year's data.
- From work completed to date, it is recommended that approximately 500 trees/ha (depending on species) be selected and marked early on in the rotation. These trees will form the final timber crop. Foliage may be harvested from branches removed in pruning operations and from remaining non-timber trees.
- From observation, it appears that the optimum method of controlling height is to top trees designated for foliage harvesting at 2 m. This would need to be carried out on an annual basis.
- In the noble fir trial, the experimental area was thinned by removing every second line; it now appears that a heavier intensity regime may be necessary to slow down canopy closure. Further research is required to investigate the optimum stocking for foliage production from noble fir.

For all species, it is evident that there is a need for more information regarding establishment and spacing.

### Screening of a range of minor forest and associated ornamental species for suitability as cut foliage

The main objective of this work is to establish trial plots of species with market potential and to monitor and observe

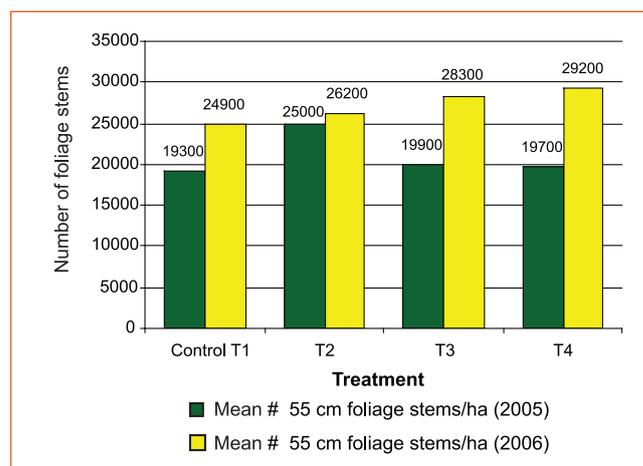


Figure 1: Japanese larch foliage yields.

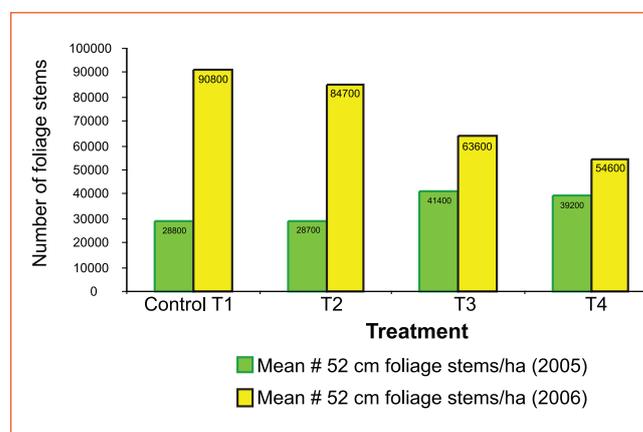


Figure 2: Goldcrest foliage yields.



Figure 3: Recovery of Japanese larch.

their growth, susceptibility to pest and disease attack and suitability for foliage production.

Based on discussions with those in the foliage and related businesses test species were chosen using the criteria: leaf colour, leaf shape, known potential stem length and productivity potential.

Forest species being screened include a selection of *Chamaecyparis* cultivars, giant sequoia (*Sequoiadendron giganteum*), Japanese elkhorn cypress (*Thujopsis dolabrata*), a range of fir and pine species, and others. The trials were established in October 2005 on a site near Tralee, Co Kerry. Growth will be assessed at regular intervals, and incidence of pests and diseases will be noted during the growing season. Comments and suggestions made by buyers regarding the species will be recorded as part of the market assessment.

## Foliage and the environment

As in other land use activities forest foliage production needs to take environmental considerations into account. As is the case with other non-wood forest products, the sustainability of harvesting forest foliage is becoming more important to customers. While attitudes to environmental issues vary, most of the larger supermarket chains insist on supplier compliance with MPS<sup>1</sup> or EUREPGAP<sup>2</sup> protocol. A sizeable market exists for foliage from many forest species, such as moss, ivy and bog myrtle. However, to ensure that harvesting does not adversely affect the environment, the development of appropriate certification protocols is necessary.

## Foliage and the community

A viable forest foliage enterprise can bring with it a range of social benefits. In field-grown foliage crops it is estimated that 2 to 3 ha will provide full time work for one person in



▲ Forest foliage screening trial.

▶ *Chamaecyparis lawsoniana*  
pembury blue.



▲ *Hedera helix arborescens*.



▲ *Sequoiadendron giganteum*.

maintenance, harvesting and processing. This level should also apply to most forest crops, as the same level of management will be required. One company in Kerry currently employs 35 persons full-time, and over 100 at peak times.

From a grower's perspective, foliage sales can generate revenue early on in the forest rotation, which may be used to fund maintenance activities. Also the majority of species suitable for forest foliage production possess high amenity value and plantations could be used for recreation.

## References

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<sup>1</sup> MPS is a Dutch certification system developed for the floriculture industry. Its aim is to reduce the environmental impact of the industry and improve the image of the sector. For a forest foliage enterprise to be approved by MPS, it must provide evidence of operating in a sustainable and socially acceptable manner.

<sup>2</sup> The Euro-Retailer Produce Working Group (EUREP) represents leading European food retailers and aims to promote good production practices in the agricultural sector in order to ensure food safety. EUREP has developed a framework for Good Agricultural Practice, called EUREPGAP, and elaborated these into specific standards for the production of fruits and vegetables, combinable crops, livestock, feed and flowers (taken from the website: [www.agribusinessonline.com/regulations/eurepprotocol.pdf](http://www.agribusinessonline.com/regulations/eurepprotocol.pdf)).