

Strength in diversity

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Within the Afforestation Grant and Premium Scheme, landowners can avail of a range of 12 GPC options including productive conifers, broadleaf species and native woodland, as well as agroforestry and forestry for fibre. Teagasc research is supporting these forestry diversification possibilities.

Current forest composition

Figure 1 presents overall species composition in Irish forests, captured by the Forest Service National Inventory, 2012. Sitka spruce continues to be the predominant species (52%) and this figure is close to 60% for grant-aided private forestry only. Almost 26% of the forest estate contains broadleaf trees species. A relatively low 9.2% comprises diverse conifers – Norway spruce, Hybrid larch, Scots pine and Douglas fir.

GPC options

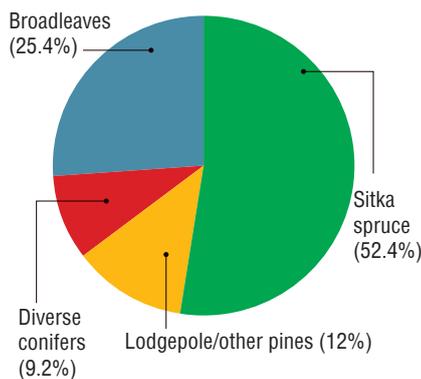
Sitka spruce is one of the mainstay species and is likely to continue to be. It has a wide native range and excellent growth particularly on moist, relatively fertile soils under conditions of high atmospheric humidity. It is the species of choice for landowners looking at a relatively short rotation and well managed and productive crops deliver a strong return on investment. Sitka is planted as the main species in combination with at least 10% diverse species as GPC 3.

Other species may also merit consideration, particularly given the increased range of soils and sites available for planting in recent years.

A strong case can be made for widening the species composition of forests, either through more diverse species and/or appropriate mixtures. This would diversify our future timber product range while enhancing the ecological value of forests.

Diversification may also significantly increase forest resilience to potential threats such as climate change or new pest or disease outbreaks. The

Figure 1: Irish forestry - composition by general species groups (%)



Source: Forest Service National Forest Inventory 2012

relatively recent and serious occurrence of *Phytophthora ramorum* on Japanese larch, resulting in this tree species's withdrawal from current planting, is an example.

The GPCs available under the new forestry programme allow for a range of options to be considered. Douglas fir is an example of a diverse conifer species (GPC 5) that can produce valuable timber suitable for a range of end uses. Like any species, the key to its success is the selection of appropriate planting sites. It is best suited to deep, well drained soils with at least moderate fertility. It is unsuited to heavy, exposed, peaty or alkaline soils. Deer damage is also a significant issue. Other diverse species such as Norway spruce and Scots pine are options on appropriate sites.

Since its introduction on a pilot basis in 2015, there has been a developing interest in agroforestry. GPC 11 supports the establishment of silvopastoral agroforestry, combining forestry and pasture. It allows farmers to farm conventionally while growing a timber crop in the same field (plate one).

Broadleaf trees established at a

wider spacing and managed for high quality can potentially be produced with grazing or fodder production between rows of trees. This option offers continued access to the land, income from agricultural production, improved drainage, shelter, high-quality timber and a range of environmental benefits.

Full details of the range of GPC options and associated funding are available on: <http://www.teagasc.ie/forestry/grants/index.asp>

Other conifers

Richard Walsh, a Teagasc Walsh Fellow PhD student, is currently involved in a review of minor conifer species. The limited species choice is a concerning factor and this has been emphasised in recent years, with effects of climate change and biotic threat risk. Under the guidance of Teagasc researcher Dr Niall Farrelly, Richard is examining species with the potential to provide an added role to plantation forestry and to widen species selection options.

Richard's work is placing emphasis on screening of candidate species with potential under Irish conditions,



Plate two agroforestry. INSET: Plate two Pacific Silver Fir is one of many species for screening.



Short rotation forestry species

Teagasc Walsh Fellow PhD student Susan Foreman is investigating the effect of planting density on the physiological responses and growth of potential short-rotation forestry species in Ireland. This research will study the optimum growing density and rotation length for short rotation forestry for use in the biomass industry.

This work is part of the overall collaborative ShortFor Project, which is exploring the potential of short rotation forestry in Ireland to meet renewable energy demands. It incorporates a multi-disciplinary team from UCD, Trinity College, University of Limerick and Waterford Institute of Technology.

including productivity on a range of sites, a capacity to produce high-quality timber, but also with resilience to the threats outlined.

Candidate conifer species to be screened include Coastal redwood and Pacific silver fir (plate two). Suitable species can provide potential in mixed plantations and/or to extend the ecological range of Sitka spruce. They also deliver functions in forests, such as shade tolerance, which can be advantageous in mixed unevenly aged forest plantations or in continuous cover forestry.

Birch and alder improvement

Teagasc has been conducting research into birch and alder improvement for some years. Recently, the use of birch and alder has increased in the forest planting programme. Seed propagation from the Teagasc tree improvement programme is now being utilised in commercial nursery production with improved birch likely to be available for planting in the 2016/2017 season. Improved birch is now also eligible for planting as a commercial timber crop (GPC 8). As well as working on birch improve-

ment, Teagasc researcher Oliver Sheridan and colleagues are progressing towards the objective of facilitating the availability of improved alder planting stock.

Broadleaf mixtures

The Teagasc Broadleaf Silvicultural Research Programme has incorporated a range of research objectives, including the establishment of optimum broadleaf mixtures.

Teagasc researcher Dr Ian Short and colleagues are investigating the effect of alternative configurations of broadleaf crops and shelter mixtures, which can also diversify our forest resource. Examples of trial configurations include oak and birch in banded mixtures and oak established in shelterwells (small groups in a matrix with shelter providing species).

Broadleaf trees (genetic resources)

Most of the planting material of broadleaves being afforested comes from wild-collected seed which is driving the need for higher genetic quality. Teagasc aims to make genetically

improved planting stock available for nurseries to multiply and landowners to use in new plantations.

A Teagasc programme, driven by Dr Gerry Douglas, operates in collaboration with the Future Trees Trust to identify highly selected, as well as trees in mature stands of several species (eg sycamore and oak). These are being propagated and used as parent trees to generate improved trees. The first seed-producing orchards of species such as sycamore are being established in 2016.

A further project is focused on securing a set of individual ash trees which may show resistance to ash dieback (Chalara). Such resistant trees are being identified by screening individual trees under conditions of high disease pressure. The resistant trees may then be utilised directly through vegetative propagation. The technology for vegetative propagation of ash has been developed and can be potentially scaled up for mass production of Chalara-resistant trees in the future. This work is being carried out by Teagasc Walsh Fellow Gemma Worswick.