

# The potential for agroforestry in the Falkland Islands

**J. H. McAdam**

Dept. of Applied Plant Science, Queens University Belfast and United Kingdom Falkland Islands Trust, Newforge Lane, Belfast BT9 5PX, Northern Ireland, UK. jim.mcadam@dardni.gov.uk

## Abstract

In the Falkland Islands (UK dependent territory; lat. 51-52°S, long. 57-61°W) land use is almost exclusively sheep grazing and the vegetation is acid moorland with no indigenous tree cover. Shelter from the strong cold winds would be extremely advantageous to sheep flocks and might allow crops to be grown in a diversified rural economy. Such trees might be integrated in silvopastoral systems. Previous experience with more widespread tree planting was largely unsuccessful and pessimistic and in 1989 the UK Falkland Islands Trust (UKFIT) commenced a programme of research into factors affecting the establishment of conifers to act as initial windbreak protection in shelterbelts. A trial was established on a grassland and a heath site comparing the effect of ground preparation and nutrition on establishment and early growth. Since then the Department of Agriculture (DoA) has established five shelterbelts. There is a need for high-quality, wind-firm seedlings and work has commenced on a research programme. The trials have demonstrated that trees can be successfully established into native grassland in the Falkland Islands and that shelter is likely to have a significant impact on pasture production. The resultant soil improvement is likely to improve the chance of growing improved forage species and impact significantly on land development. The original trees planted in 1989 are now at a stage where stock might be introduced in a silvopastoral system where shelter and nutrition could be enhanced.

**Key words:** shelterbelts, *Pinus contorta*, pasture production, sheep grazing

## Introduction

The Falkland Islands have a cool (2°C-9°C temp. range), dry (max 750 mm/year) climate with exposure to salt-laden winds, high levels of incident sunshine and periodic dry spells. The soils are acid peats with low levels of mineralization and poor drainage in many areas. Vegetation is dwarf shrub heath or Magellanic moorland and trees are virtually absent (Summers and McAdam, 1993). The flat or gently undulating landscape results in little opportunity for shelter from the cold winds (McAdam, 1985). The inherently low soil fertility and the poor quality and productivity of the natural pastures result in levels of sheep production which are low due to the poor nutritional base and adverse climatic exposure (McAdam, 1985). Agriculture has been traditionally dominated by sheep from large wool-producing farms operating at a low level of input and output and farm ownership has been restructured towards smaller, family operated units since the 1980s. There is a need to diversify the range of agricultural production and to consider wider land-use issues in relation to a diversified rural economy. Trees, by enhancing soil quality, providing shelter and producing an industrial product for local use are an essential prerequisite to this view of an expanded rural economy. There are currently only a few hectares of established woodland on the Islands, largely as a result of soil and climate limitations, unenthusiastic advice and the availability of planting material of suitable provenance (Low, 1986). Strategically placed shelter around settlement farms or in breeding stock camps could be used over the critical periods of lambing and shearing to make a very significant impact on lamb survival and on sheep recovery after stress. The production of beef cattle is to be promoted following the decision to build an abattoir, and improved pasture and cereal or fodder cropping will be needed to sustain this stock.

There have been sporadic attempts to establish trees over the past 80 years or so (McAdam, 1982; Low, 1986). These have been largely unsuccessful (with a few exceptions) up until a programme was initiated by the UK Falkland Islands Trust in 1989 (McAdam, 1996). This chapter summarizes trials to establish introduced conifers into pasture as shelterbelts and an ongoing programme of tree improvement and integration into silvopastoral systems.

## Materials and Methods

In an initial pilot trial, tree planting and establishment were investigated (by UKFIT) on two sites, a shrub grassland and a shrub heath. Lodgepole pine, *Pinus contorta*, was either slit (or notch) planted or pit planted (small pit dug to disturb the soil). Small plots of trees received either no fertilizer or phosphate only, or kelp compost (in the pit).

Subsequent to the above trial, in 1995 the DoA planted five shelterbelts on farms at a range of locations. These were approximately 2 ha each in mainly coastal provinces, using lodgepole pine (Low and Kerr, in prep.). In light of the success of the above trials, a programme to investigate tree seedling production and species selection was carried out. Trees (*Salix*, *Eucalyptus*, *Pinus contorta*, *P. radiata*, and *Nothofagus*) were grown either bare root or in a range of containers and planted out in the Falklands in spring 2003.

## Results and Discussion

*Pilot trial.* Growth on the grassland site was better than on the heath site and overall tree growth was significantly greater from pit-planted trees than slit-planted trees (McAdam, 1999). Poorer sites responded to phosphate but the effects had gone after 5 years. Composted seaweed in the pit at planting enhanced tree growth by approximately 5 cm

over the critical establishment period (McAdam, 1999). Shelterbelts were successfully established on all sites, and confirmed the importance of provenance selection (Low and Kerr, in prep.). A booklet on shelterbelt establishment resulted (Low and McAdam, 2001). *Seedling production*. By containerizing willow cuttings on transport from Europe they were able to be successfully established (Olave *et al.*, 2003). Containerized trees always established and grew better than bare root trees. Although it will take some time for the real benefits of shelter to be demonstrated, and the improvement in soil quality which will allow improved forage grasses, legumes and cereals to be grown, the indicators are that trees can be successfully grown in the shrub grasslands of the Falkland Islands and have the potential to make a significant impact on land use. The small pilot programme was greatly expanded by the Department of Agriculture's demonstration shelterbelt trial throughout the Islands. If tree planting is to be more widespread in the future, it is essential to locally produce high-quality seedlings at an economic cost. Now that cuttings can be successfully relocated from the northern to the southern hemisphere and more is known about containerization, advances in local tree seedling production can be made. The integration of the established pines into farming systems can be envisaged at several scales: (a) stock could be allowed controlled access to the original (1989) planting to create close-contact silvopasture or woodland grazing; (b) an area of wide-spaced and protected trees from fast-growing, high-quality stock could be planted in the lee of the shelterbelts and grazed (silvopasture) to create a gradual transition from open pasture to shelterbelt; (c) the shelterbelt could remain as a stock-free area for the foreseeable future with stock/crops utilizing the land up to its boundary (agroforestry). It is recommended that option (c) is the best course of action to follow at present with a strategy to adopt (b) and (a) in the medium and long term, respectively.

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