

Sandy Rose, the genius of Ledmore

By Michael Lawrence

When the Forestry Commission (FC) first expanded its planting programmes during the 1920s and 1930s, the work was tedious, repetitive, and back-breaking. Soil was turned by spade. Every seed was sown by hand. Seedlings were transplanted manually. And weeds were removed with tools or nimble fingers.

After WW2 there was a technical revolution in UK forestry and the speed of change was greatest in the Commission's nurseries. One man dominated nursery invention and innovation in the 1950s and 1960s – Alex 'Sandy' Rose MBE (1905–1987). This is his story.

Sandy Rose

Sandy Rose was born in the village of Geddes, educated in Nairn and Elgin, and left school in 1919 to start work as a trainee forester on the Earl of Moray's Darnaway Estate. In 1923 he joined the fledgling FC and for the next 16 years worked his way through the ranks at Heldon and Newton in Morayshire.

At the outbreak of WW2 Sandy was already a Sergeant in the Territorial Army and was called up immediately. He served with great distinction for six years as Sergeant Major in the Seaforth Highlanders and saw direct action at Dunkirk, El-Alamein, Anzio and the Elbe. He retained a military bearing for the rest of his life, particularly his perpetual and well trimmed moustache.

On demobilisation in 1945, Sandy returned to the FC and was soon given responsibility for establishing a clonal seed orchard in the southern part of the East Conservancy, to replicate his



Sandy Rose (centre) demonstrating the Ledmore Seed Sower to some visitors to the nursery.

pre-war experience at the Newton Nursery, near Elgin.

Ledmore Nursery

A small nursery in Perthshire was first set up on a 20 acre (8ha) site at Belstane Farm, near Bankfoot in Perthshire, but in 1949 the Commission acquired 130 acres (53 ha) at Ledmore Farm, again near Bankfoot. Ledmore was selected because of the sandy soil, the rare unseasonal frosts, and the availability of skilled agricultural labour.

When acquired, Ledmore was badly run down, hard-panned in parts, and heavily infested with weeds. In spring 1950 some 20 acres were deep-ploughed, cleaned, sub-soiled and green-cropped. By 1951 the ground was still considered too dirty for large seed lining-out and a further round of green-cropping was necessary. And so it was not until 1952 that a southern seed nursery in East Conservancy came in production.

That year seven million seedlings were lined out. Within four years some 56 acres (23ha) were under nursery and this could be extended to 75 acres (30ha) as the need arose. The balance of the

farmland at Ledmore was transferred to Strathord Forest or sublet as agricultural land to neighbouring farmers.

Output in 1956 was six million seedlings, 4,275 pounds (1,928kg) of hardwood seed and 56 pounds (25.4kg) of conifer seed, and this pace of production was maintained for the next decade or so. In the early days Ledmore concentrated on the development of Scots pine and Douglas fir, but by the mid-1960s production species also included lodgepole pine, larch, Norway and Sitka spruce.

The number of workers at Ledmore varied seasonally, with around 30 employees during spring and summer when lining-out and weeding created the highest demand. The permanent workforce dropped to around 20 during autumn and winter. It was a shortage of general labour, particularly women, which led to intensive mechanisation of the heavier work throughout the growing process. At Ledmore, necessity was truly the mother of invention.

Sandy Rose, as Head Forester, and Jimmy McLean, as Forester, meticulously planned the whole nursery at Ledmore

THE AUTHOR

Michael Lawrence is a local historian and current chair of the West Stormont Historical Society in Perthshire. Address: 10 Dowanside Road, Glasgow G12 9DA. Email: mflawrence@btinternet.com

➤ to make it easy to use tractors, machines and power tools. Careful thought was given to layout so that machines could operate efficiently and economically. Roads were deliberately positioned, sections were made as long as possible to save unnecessary turning, and seed beds were laid out in widths to suit the equipment. Odd corners and margins of irregular shape were used for growing hardwoods, poplar stool beds and Christmas trees.

There was one permanent road to the nursery office and buildings at Ledmore, and access roads to the nursery beds and agricultural areas. All earth roads were kept meticulously clean of weeds. Hedges were built as shelterbelts and planted at precise angles to counter the prevailing wind. It was hoped, that by planting section belts and hedges and by enclosure from the surrounding plantations, the nursery would be protected from windblown weed seeds.

Strict crop rotation was followed at Ledmore and normally one-third of the nursery area was green-cropped each year. After growing two successive crops of plants, organic or inorganic manures were applied according to soil analysis and prescription. It was regarded as essential to make good the high degree of exhaustion caused by the growing and removal of tree crops. Oats and vetch were then sown and ploughed-in when succulent in late July or August. Once decomposition had taken place, the sections were then ploughed back in September or early October to ensure a high composition of humus in the topsoil. The history of each section at Ledmore was rigorously recorded, giving soil analysis, manure applications, and the annual tree crop or green crop raised.

There was a period in the 1950s and 1960s when Ledmore was the must-see destination for forestry dignitaries from all parts of the world. Senior FC staff, from across the UK, were regular visitors, particularly the Genetics Section and Mechanical Research. The Royal College of Foresters from Sweden, the New Hampshire Forestry Commission from the United States, and the Society of Irish Foresters all left reports of their visits to Ledmore in the archives. Their main purpose was to see the showpiece nursery and its tree development work, and to view the practical application of the many machines designed by Sandy



The Ledmore Six Drill Seed Sower.

Rose to mechanise the nursery process.

Here is a summary of his most significant inventions at Ledmore:

The Ledmore Six Drill Seed Sower and Grit Distributor

In the 1950s Sandy Rose worked on the development of a plant suitable for the forest without the expense of lining out. Experiments on undercutting one-year conifer seedlings led to what became known as a 'one undercut one' or '1u1' plants. The six drill sowing machine was designed by Sandy Rose to sow seeds thinly in drills so that, after undercutting, the conditions for growth were not dissimilar to transplant lines.

The Ledmore Sower had a large roller, a small roller, six hoppers and inside each a shaft carrying bristles and spoons agitated to ensure a steady flow through an adjustable aperture near the base, and down a telescopic delivery tube to a drill shoe.

The Ledmore seed sower was designed to sow a three-foot-wide seed bed with drills at six-inch intervals, the tractor wheels running in the alleys between the beds. The rate of delivery was set according to germination capacity. The Sower was adjustable to sow a variety of seeds and could be converted from drill to broadcast with little fuss. The hopper and feed was adapted to fit the grit distributor, which in turn was modified to confine the grit to a drill width.

The Ledmore Lining Out Plough

This was the invention that gave Sandy Rose a worldwide reputation amongst foresters and nurserymen. John MacEwan, a past President of the RSFS and author of the influential 1977 book *Who Owns Scotland*, described the Ledmore plough as a 'miracle', which 'cut out the slavish work of a countless number of men and women crawling all day on their knees on the ground'.

The Ledmore Lining Out Plough which firmed up earth against the roots of trees held in boards.





Sandy Rose testing the Ledmore Root Pruner.

Lining out was revolutionised and back-breaking labour replaced by the machine.

When lining out was done before the use of boards, the worker would take a small bundle of plants in one hand and work along a prepared trench, setting each plant in turn in its place, judging depth and distance by eye. Each seedling was temporarily held in place with a small handful of earth pressed against the roots. Once the trench was completed, earth was thrown in with a spade, to complete the filling in, and trampled down and levelled with the feet. This was slow, tedious and very hard work for the return of a couple of thousand plants each day.

The next stage in lining-out development was to use an agricultural single furrow plough to prepare the soil and open up a trench, boards to space the young trees, and manual effort to compact the loose earth around the roots. This speeded up the process but much spade and foot work by skilled men still remained.

The Ledmore Twin Blade Root Pruner undercutting lodgepole pine seedlings at Glenfinart Nursery.



The big leap forward made by Sandy Rose's Ledmore Plough was that it combined in one simultaneous operation the four stages of preparing, trenching, spacing and compacting. Yet it was neat enough – the final version was only 6 foot by 4 foot ($\approx 1.9\text{m} \times 1.2\text{m}$) – to be drawn by the small Ferguson tractor that was commonly used in nurseries, greatly reducing the turning circle.

The Ledmore Plough was designed to fill in, consolidate and level a lining out trench and to cut and prepare the next trench at the same time. By Mark 3, the Ledmore Plough could be preset to control its own depth of working and modified to carry a hopper which placed fertiliser precisely where it could be mixed with the fine soil and pressed against the seedling roots.

The Ledmore practice was to strip line-out in beds of five long lines, with lines 9 inches (23cm) apart and each bed separated by an alley wide enough for a tractor tyre to pass without damage to the trees. Within each line seedlings could be set at 1, 1.5 and 2 inches apart on a modified Ben Reid board. Each machine squad averaged 140,000 seedlings per day at 1 inch, 120,000/day at 1.5 inch and 90,000/day at 2 inch. With the use of two Ledmore Ploughs and careful labour planning, around 250,000 seedlings could be lined out per day. Compare this with the pre-war productivity rate of a few thousand plants per day using a skilled squad with spades and muscle.

The strip-line method also allowed the follow through of other tractor-drawn implements such as the Ledmore Inter-Row Cultivator, the Ledmore Undercutter and the Ledmore Modified Gunn Plant Lifter.

The Ledmore Inter-Row Weeder and Alley Cultivator

The Ledmore Weeder and Cultivator was developed by Sandy Rose because there was reluctance by the FC Genetics Section to use chemical weed killers at Ledmore. It was a modified Ferguson toolbar fitted with a variety of agricultural attachments to do inter-line weeding and alley cultivation. Vertical spring tines travelled between lines of plants, and each alleyway was hoed and raked at the same time. It straddled the complete bed and covered both bed and alleyway in one operation. The number and spacing of tines was adjustable. The central tines could also be removed for weeding the alleyway only. The machine was used at tractor speeds of 3–4mph so that large areas could be covered quickly. Weeds between plants in a single line were removed by hand. As the science developed, chemical herbicides were eventually allowed at Ledmore.

The Ledmore Twin Blade Root Pruner

This Sandy Rose machine consisted of a tractor bar fitted to the hydraulic lift of a Ferguson tractor. To the tool bar were attached two cutting units, spaced three feet apart, each consisting of a steel member around four inches wide, sharpened on the leading edge. These units were preceded by discs which in operation travelled on either side of the seed bed alleys and so provided an easier passage for the steel member. Welded to the base of the vertical member were tapered blades with depth control achieved by pneumatic tyres. There was negligible cost of maintenance, spare parts were easy and cheap to source, and the machine was simple to use. The result was well-loosened soil, and seedling appearance after pruning was excellent. With each subsequent undercut, the fibrous root was maintained and increased, producing a well-balanced plant for each age group.

Ledmore Modified Gunn Lifter

The Gunn Lifter was used in many nurseries but was modified by Sandy Rose. This included resetting the broad blade angle and fitting of vertical tines so that the soil between the transplant lines was broken up ready for lifting. Once the Lifter had passed, the plants could be picked easily by hand.



➤ Conclusion

A key fact about all the inventions and innovations by Sandy Rose at Ledmore was that they were achieved after much experimentation and 'sair trauchles' but with minimal cost to the FC. He would often ask East Conservator Frank Oliver for development cash and the reply was typically 'Sandy, I'll only give you money if it works'. Invariably it did work and over the years Ledmore machines saved the FC countless £millions and greatly improved worker productivity.

Ledmore Nursery was only part of Sandy's overall responsibility as Head Forester of the 1,600 acre (650ha) Strathord Forest. He was also well known for the model nurseries which he prepared for the FC stand at every Royal Highland Show from 1949 to 1969. Over the years he delivered many lectures to forestry students at the Universities of Aberdeen and Edinburgh, and Faskally Forestry School.

Sandy Rose was appointed MBE for



Sandy Rose inspecting young spruce trees at Ledmore Nursery.

services to forestry in 1969 and retired from the FC in July 1969, aged 64. He took up a consultancy position with the FAO in Yugoslavia before settling into retirement in Bankfoot.

Sandy Rose died in 1987, aged 81. I'm very proud to say he was my grandfather and a brilliant role model who remains a constant source of memorable advice, guidance and inspiration. ☺

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