CALU Fruit tree Grafting workshop
4th March at Seiont Nursery
6th March at Treberfedd Farm

The workshops took place at Seiont Nurseries, nr. Caernarfon and Treberfedd Farm, nr Lampeter with Paul Davies from Dolau-Hirion fruit tree nursery in Llandeilo. Paul produces around 2,000 trees per year by grafting. In the morning, Paul gave an introduction to the theory and history of fruit tree grafting in Wales. The afternoon session gave the attendees the chance to practice their newly gained knowledge under Pauls' supervision and graft their first trees.

Practicing grafting skills

A grafted tree (usually) has two components: the **rootstock** and the **scion** that is grafted onto the rootstock.

There are a range of grafting techniques, but today's workshop focused primarily on whip and tongue technique.

Morning session

Paul Davies explained about the reason for grafting: Growing fruit trees from seeds is possible but as most trees are outcrossing there is no certainty that the mature tree will produce the same fruit as the fruit the pip came from. Also, apples from seed grown trees are frequently not very tasty. It is possible to propagate apples and other top and stone fruits via cuttings. However, the success rate with this method is quite low.

Another reason for using a specific rootstock with a grafted scion is that it provides considerable control over the final height, vigour and, in some cases, disease resistance of the tree.

Grafting has been practised since at least Roman times. After it became commonplace in the UK the Ministry stepped in to control diseases and viruses which occurred and to observe the growing patterns. Through this "cleaning" process, the rootstock series "M" came out (for apples) which is used nowadays to indicate the type of rootstock. M stands for East Malling where the initial research was conducted.

Some examples of the "M" series in order of size of the final tree:

M25 is the biggest of the rootstocks, used for trees with grazing underneath. As the lifespan is according to the rootstock size, it is also the tree with the longest life expectancy (about 125 years).
MM111 - This rootstock is resistant to P*hytophthera* and woolly aphid (and it confers this resistance to the scion wood). It is quite drought resistant and can cope with wet conditions but it is not widely used in Wales as is has big tap roots which are ideal for sites with deep soils, but are not common in most parts of Wales.


Apple rootstock MM111

MM106 is a very popular rootstock in Wales, ideal for large gardens or small paddocks. It also has very good success rates in pots and is hence well used in nurseries. A tree grafted on an MM106 rootstock should be productive for around 50 years.
M26 is a dwarf rootstock which needs staking and clear ground underneath as grass would compete with the tree roots.
M9 was previously widely used for commercial apple production as it is precocious and produces big fruits. However, the roots are flimsy, making them susceptible to snapping and the tree will need staking.
M27 is the smallest of the M series and suitable for growing in pots.

Different sized rootstocks are also available for pears, cherries and plums. Their characteristics can be obtained from the attached table.

In some cases, like with the William pear, some pear rootstocks and the scion wood are not compatible. However, it is possible to graft a scion to an incompatible rootstock using an interscion: a scion which is compatible to both rootstock and scion is grafted to the rootstock and the scion which is originally wanted is then grafted to the interscion.

Depending on the variety, viruses can infect grafted trees. Heat treatment, originally developed for potatoes can be used for "cleaning up" these viruses. The scion is kept in an environment of 38˚C for several weeks. This does not kill the virus, but inhibits its division and means that fresh, virus free tissue can grow at the top of the wood. This clean top growth is then used to provide a virus free soft graft in April time. Virus free rootstock is not available in the UK but can be purchased from Holland.

Apple and pear varieties can also be grafted on to hawthorn trees but care has to be taken as this method increases the risk of fire blight

General management

Preparing for grafting

Collecting scion wood for grafting has to be done in winter, when the trees are in dormant state. The collected twigs are ideally pencil diameter and are kept in the fridge to keep them in the dormant state. Grafting itself can start as early as February 1st and continue until the end of March. With milder winters occurring the start date will be earlier and the time window for grafting will be reduced.

Pears need to be started first as they are prone to start budding and callusing even when they are in the fridge

There are three main types of grafting: Whip and tongue, church window and rind graft. During the workshop, the whip and tongue technique was used (a description of all of these techniques can be found in the appendix).

Aftercare

Once the tree is grafted, pot it immediately and then keep in a warm place for the next year. The top should be covered with a clear plastic bag until green shoots are visible. Then begin removing the cover gradually – for periods during the day at first, re-covering at night until the plant is strong.

Recently grafted trees

Shoots on the rootstock (hence below the graft) need to be removed, by gently rubbing to the side, as they will not produce the desired variety.

Compost mix and watering

Paul uses a standard mix compost from Sinclairs with 50% bark and 50% peat and vine weevil control (e.g. with products containing imidacloprid). Mixtures with bigger particle size with higher bark content complicate moisture content control. .

Labelling

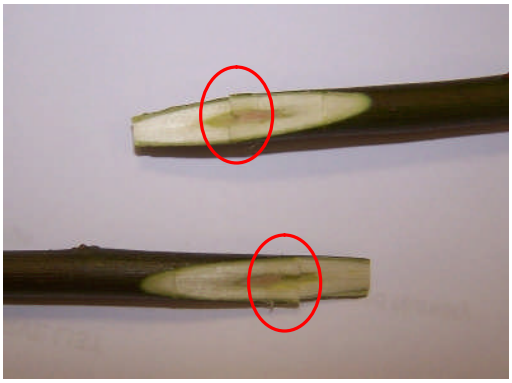
There is an unofficial labelling system using different colours to identify the rootstock. The variety name is added by hand onto the coloured label.

Every tree nursery dealing with *Malus* spp., Pyrus spp. and *Prunus* spp. (apples, pears, cherries and plums) needs a licence from Defra. This

provides a passport number which has to be put on the label and invoices of all stock sold.

Afternoon session

Paul explained the technique to make the cut and the attendees practiced using the grafting knifes on willow twigs. Once everybody felt comfortable using the knife Paul had a variety of different sized rootstocks and several apple varieties available for grafting.



Corresponding cuts with nicked ends - the whip and tongue technique

Having practiced the cuts on willow wood, it was easier for the attendees to do the cuts on fruit tree wood as it proved smother and softer to cut. One scion can be divided into several pieces and hence used to produce more than one graft.

Once the joints were grafted together and the ends of each cut were nicked (see picture above), a stretchable plastic tape was wrapped around to keep the air out of the joint. As this band is stretchable, it will expand with the tree growth.

The day was a great success and feedback was very positive. Many people grafted several trees to take away and grow on in their own nurseries.

Grafting the first trees

The following information was provided by Paul Davis, Dolau Hirion Fruit Tree Nursery, to attendees at the workshop.

Characteristics of rootstocks

Type	Rootstock	Tree height	Trunk height	Planting distance	Perm. staking	Management	Suitable for
APPLES							
vigorous	MM25	25’	6’	25-30’	No	Grazing	Standard trees
Vigorous	MM111	20’	4’	20’	No	Grazing/mowing	Standard & half-standard
Semi-vigorous	MM106	12-15’	3’	15’	No	Mowing	Half-standard, bush & pot
Semi-dwarf	M26	10-12’	2.5’	12’	Yes	Keep clear of vegetation	Bush, cordons & espaliers
Dwarf	M9	8-10’	-	8’	Yes	Keep clear of vegetation	As M26 on good soil
Very dwarf	M27	5-6’	-	-	Yes	Keep clear of vegetation	‘patio’ apples
PEARS							
Vigorous seedling		30-40’	6-8’	30-40’	No	Grazing	Standard trees
Semi-vigorous Quince A		12-15’	3-4’	15-18’	No	Mowing	Half-standard & all trained forms
Dwarf Quince C		8-10’	-	10’	Yes	Keep clear of vegetation	Bush, cordon & espaliers
PLUMS							
Semi-vigorous	St.Julien A	12’-15’	-	15’	No	Mowing	Half-standard, bushes & fans
Dwarf	Pixy	8-10’	-	10’	Yes	Keep clear of vegetation	Small bushes & fans
CHERRIES							
Vigorous	F12.1	30-40’	6-8’	30-40’	No	Grazing	Standard trees
Semi-dwarf	Colt	10-12’	3-4’	12’	Yes	Mowing	Half-standard, bush & fans
Dwarf	Tabel	8-10’	-	8’	Yes	Keep clear of vegetation	Bushes & fans

Grafting of apples and pear trees (notes provided from Paul Davis for the workshop)

Collecting scion wood

This is done in late winter (January) when the wood is completely dormant. Cut off lengths of last year's growth, which should ideally be pencil thickness, put in polythene bags, tie and store in the salad compartment of a fridge or in a cool, dark place.

Rootstocks

Rootstocks can be produced at home by 'stooling' but it is best to buy certified stock from a reliable source such as Frank P. Matthews, Berrington Court, Tenbury Wells. In general choose 1-2yr, 7-9mm stock but if your scion wood is very thin or you are going to grow the stock on for a year before grafting then go for 5-7mm. When grafting standard pears, use 5-7mm seedling pear stock as this is usually well oversize.

Grafting

Grafting normally begins in mid-February with pears and finished in mid-March. Any later seems detrimental to the young rootstock, which can be severely shocked by the process and even die.

Whip and tongue

This type of graft is done when the scion and rootstock are the same size.

1. Make a flat sloping cut in the scion about 4-6 times the diameter. If you make this cut opposite a bud this is supposed to improve healing but I've found that the bud often dies and is a point of canker infection later.
2. Study the stock and cut the top off about 1" higher than that point which is the same thickness as the scion.
3. Make a corresponding slanting cut in the stock, again opposite a bud if you believe all you read.
4. Make small, corresponding cuts or tongues in the flat surfaces of both scion and stock. Check that they mate up.
5. Cut off the top of the scion at 3-5 buds – experience will tell.
6. Assemble the graft and bind with tape – 1" strips of freezer bag are ideal.

Church window

This type of graft is used when the scion is somewhat smaller than the rootstock.

1. As above but only cut a corresponding slice off the side of the stock.
2. If the stock is a lot larger than the scion, apply grafting wax or beeswax to the cut surfaces before binding with tape.

Rind graft

This type of graft is used when the stock is very much larger than the scion eg. when stub grafting a mature tree and is normally done in April when the bark parts easily.

1. Cut off a branch on the stock tree and cut a downward slit in the bark.
2. Make a slanting cut in the scion as before and slide into the cut in the bark.
3. Bind with grafting tape and make sure that any exposed cut surfaces are painted with wax.
4. Use one scion per inch diameter of cut stem.

Aftercare

Buds will start to grow on the stock. Remove these before they are more than 1“ long with a sideways action to prevent damage to the bark. Cut the knot on the grafting tape in late June when the union should be swelling nicely. Stake and tie the graft above and below to prevent it breaking ion the wind. In late July, trim back any side shoots to 2”. Cut off these side-shoots completely in November unless you need them for a cordon or espalier.

Hot grafting wax

5 parts paraffin wax	or	Pure Beeswax
1 part Zinc Oxide		
3 parts Fullers Earth		