DEVELOPING ORCHARDS FOR FUTURE CIDER APPLE PRODUCTION

Trials Report Summary 2010-2011

Contacts : East Malling Research – angela.berrie@emr.ac.uk
jean.fitzgerald@emr.ac.uk

NACM copas@easels.fslife.co.uk

Background

At present most apples for cider production are grown in bush orchard systems based on research conducted at Long Ashton Research Station (LARS) in the 1970s and 1980s. The trees in these systems are grown on semi-dwarfing rootstocks mainly M.M.106 and M.M.111 which produce trees around 6 m in height. A range of apple cultivars are used to extend the harvesting period from September to December and to produce a range of apple types from bitter sweets with high tannin content to low tannin cultivars. The cultivars vary in susceptibility to pests and diseases, especially to apple scab and mildew, which can significantly reduce yield and fruit quality and increase susceptibility to rots such as brown rot (*Monilinia fructigena*) if not adequately controlled. Therefore, in general, most orchards receive frequent applications of pesticides to minimise losses. Such sprays are applied by orchard air blast sprayers at high spray volumes to ensure adequate spray cover to the tops of the trees but which also give a high risk of spray drift. In the future such methods of spray application may not be permitted and will need to be replaced by tunnel spraying systems that contain, capture and recirculate the spray and minimise unwanted spray drift.

Cider apples are machine harvested from bush orchards using tree shakers to dislodge fruit from the tree and machine collected from the ground on to trailers. Harvesting fruit from the ground may also not be permitted in the future and will need to be replaced by tree shake and machine capture methods.

Many bush orchards will reach the end of their productive life in the next 5-10 years and need to be replaced. Future tree planting systems must take into account the likely changes required in harvesting and pesticide application techniques for which the current bush system is not suitable. More suitable systems would be based on growing trees on more dwarfing rootstocks such as M.9 and at closer spacing to increase yields and to produce a hedgerow system that could be sprayed using a tunnel sprayer and harvested using a shake and capture method. M.9 rootstocks produce trees of around 2-3 metres in height but have poor anchorage compared to M.M.106 or M.M.111 rootstocks and therefore are not suitable for harvesting by tree shaking. The use of interstocks with the semi dwarfing rootstocks may produce the desired reduction in tree height but still maintain the necessary anchorage. In addition to identifying new rootstocks a range of new cider apple cultivars from the LARS breeding programme varying in harvest date, tannin content and pest and disease susceptibility may be suitable for future commercial production.

The purpose of the work described here is to evaluate rootstock and interstock combinations with potential new cider apple cultivars, initially over a five year period, for their suitability for modern cider apple orchards. This project, which started in 2008, will enable recommendations to be made to growers on orchard systems for future plantings.

Trial details

Rootstock / interstock combinations and Cultivars

Six rootstock / interstock combinations were selected for evaluation (Table 1).

Table 1. Rootstock / interstock combinations evaluated

Treatment	Rootstock	Interstock
1	M25	M9
2	M25	Starkspur
3	MM106	M9
4	M116	M9
5	MM106	none
6	M116	none

Three new scion cultivars – Angela, Lizzie and Tina are being evaluated and compared to Dabinett and Katy as standard cultivars grown for cider production. The details of these cultivars are given in Table 2. A total of 30 different cultivar / rootstock / interstock combinations are being evaluated in the trials.

Table 2. Details of cultivars used in the trial

Scion cultivar	Type	Maturity
Angela (A)	Medium bitter sharp	Late September-Early October
Dabinett (D)	Full bitter sweet	Late October
Katy (K)	Sharp	August-September
Lizzie (L)	Medium bitter sweet	Early September
Tina (T)	Full bitter sweet	Early-mid September

Trial locations and plot details
The trial trees were planted out at three sites

Site 1 – Thatchers Cider, Sandford, Somerset

Site 2 – Perrin's Hill Farm, Tintinhull, Somerset

Site 3 – Bulmer's Lower House Farm, Staunton-on-Wye, Herefordshire

The trees were planted with 5 m spacing between rows of trees and 2.5 m spacing of trees in the row. Each plot contained 9 trees and each treatment (cultivar / rootstock combination) was replicated 5 times in a complete block randomised design. All plots received the grower's standard programme for pest and disease and nutrients applied using a tractor trailed orchard air-assisted sprayer.

Assessments
At each site assessments were made for:

- Pest and disease incidence which was assessed twice using a scoring system of 0-5 where 0 = nothing and 5 = most of tree affected. Assessments were in spring / early summer (May / June) and in late summer (July / August)
- Tree shape and form – suitability for hedgerow system
- Yield

Summary of main results in 2010

Pest and disease

- The lowest incidence of apple scab was recorded on scion cultivars Angela, Lizzie, Dabinett and Katy (Fig. 1)
- The lowest incidence of powdery mildew was recorded on scion cultivars Angela and Dabinett (Fig. 2)
- At site 2 a number of trees died, mainly due to wet feet. Trees on rootstock / interstock combinations of M.25 / M.9 and M.25 / Starkspur appeared most susceptible and trees on M.116 least susceptible. Most tree deaths occurred with the scion cultivar Dabinett (Fig. 3)
- The incidence of blossom weevil and sawfly was high on scion cultivar Katy at sites 2 and 3 resulting in almost no fruit on this cultivar at harvest (Fig. 4). See 2010 yield summary below

Tree shape, form and suitability for Hedgerow System

- Lizzy is rather upright and fastigiate but spreading satisfactorily with the weight of the fruit. Excellent trees, good on all of the combinations of stock/interstem
- Angela is also very good but more variable. Compact with good, spreading branch angles. Best on M.M.106, M.116 and M.25 with M.9 interstock
- Tina is a weak and spreading cultivar. Many of the leaders broke under the weight of fruit (site 1). This selection is best on a strong stock, M.M.106 and M.116, or on M.25/M.9 interstock
- Tree habit of Dabinett is variable; poor on M.25/M.9 with much bare wood, but good on M.M.106/M.9, M.116 and M.M.106
- Katy is usually a strong upright tree often with much unproductive bare wood. It performed best on M25/9 or MM106
- The consistently best stock/stem/scion combinations were MM106 and M116. M.25/Starkspur was good for Katy, Lizzy and Tina. M.9 interstem made the poorest combinations except for Dabinett

Crop yield 2010

- There was no interaction between the effect of the cultivar and rootstock
- At site 1, cultivar had the greatest effect on yield; Katy being the heaviest. Yields of Angela and Tina were similar. Lizzy was lighter and Dabinett gave the lowest yield. Rootstock M.M.106 was the highest yielding combination and those with M.9 interstem the lowest
- On site 2, the pattern was reversed; best were Angela and Tina with similar yields, followed by Dabinett, Lizzy and with Katy the lowest. The best rootstock combinations were M.M.106 and M.116, and the poorest the two M.25 combinations
- On site 3, the greatest effect on yield was from cultivar; Angela being the highest yielding followed by Dabinett and then Tina. Lizzy was considerably lower and Katy lower still. Tina on this site performed best on M.25/M.9
- The introduction of M.9 reduced the yield at sites 1 and 2 but not at site 3
- At sites 2 and 3 the yield of Katy was significantly reduced by sawfly and blossom weevil attack

Summary of main results in 2011

- The results from assessments in 2011 were, in general, similar to those in 2010
- Pesticide treatments applied for control of blossom weevil and sawfly were better timed so that damage by these pests was much reduced. Nevertheless the incidence of blossom weevil and sawfly damage was in general greater on cv. Katy
- There was a low incidence of leaf midge and caterpillar damage on shoots at all 3 sites, but the incidence was related mainly to shoot growth
- The incidence of apple scab was lower than in 2010 mainly due to the exceptionally dry weather in April and May. However, scab incidence was significantly higher on cv. Tina as in 2010, confirming the high susceptibility of this cultivar to scab
- Weather conditions were more favourable for spread and development of powdery mildew. The incidence of mildew was significantly higher on cv. Tina at all 3 sites, confirming the high susceptibility of Tina to powdery mildew. The lowest incidence of mildew was generally on cv. Angela
- Leaf spot was present at all 3 sites and was significantly higher on cv. Dabinett. In 2010 the incidence of leaf spot appeared to be associated with significant reductions in yield. The cause of the leaf spot has not yet been established

Fig. 1 Mean score(0-5) for apple scab recorded in August 2010 at Site 2 - Tintinhull

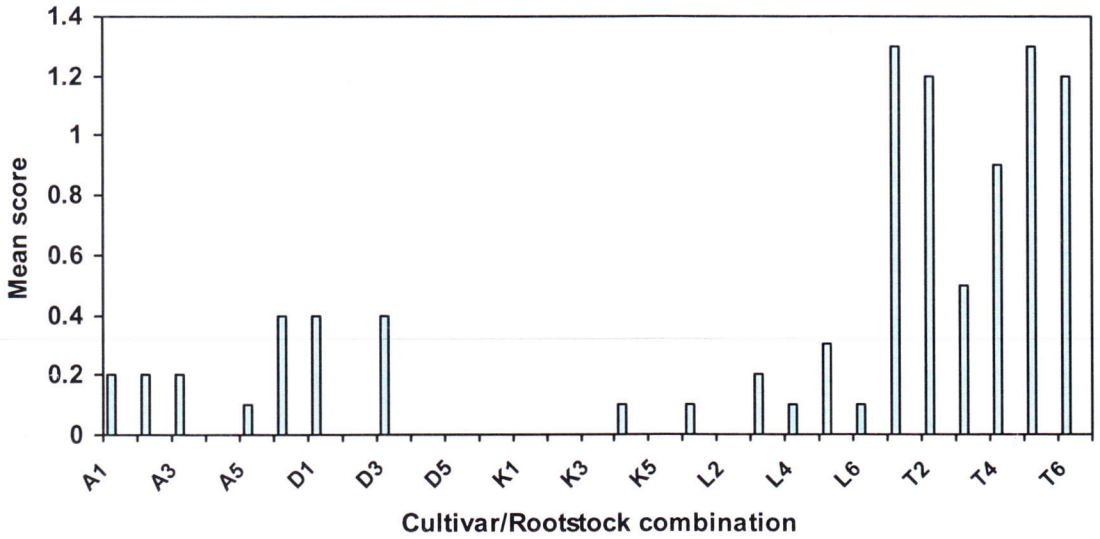

Fig. 2 Mean percentage dead trees recorded in August 2010
at Site 2 - Tintinhull

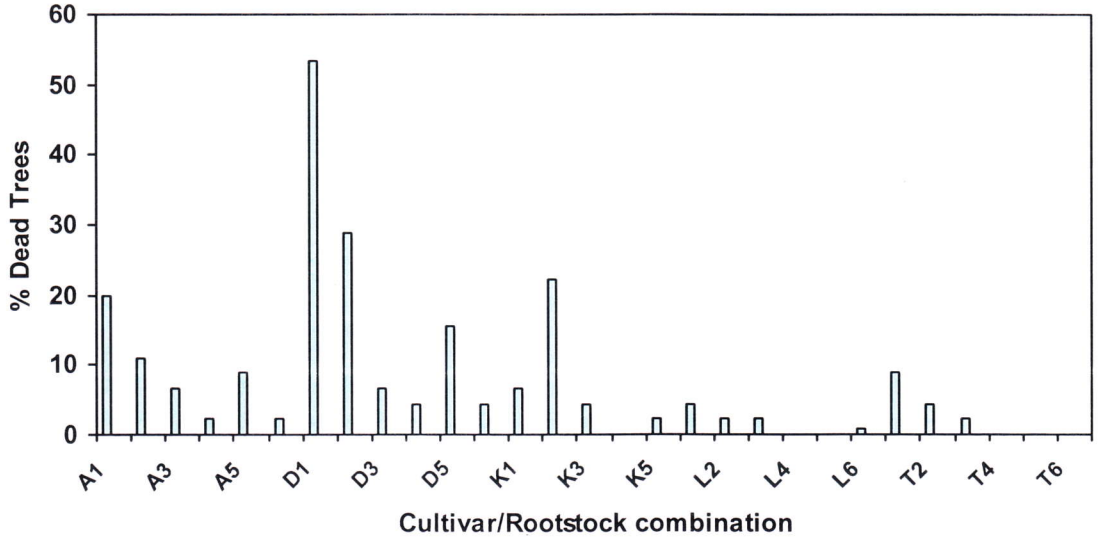

Fig. 3 Mean score(0-5) for blossom weevil recorded in June 2010
at Site 3 - Staunton-on-Wye