Preliminary investigations and reflections on the potential of nut production from walnut and chestnut in the UK

Growth and yield information for chestnut and walnut is discussed. Potential products and agroforestry systems are outlined.

Introduction

Nuts from walnut and chestnut trees are not currently seen as an economic crop in the UK. Conventional wisdom would say that with our late spring frosts and the low number of degree days, compared to the continent, economic production would be impossible in most of the UK. Preliminary analysis of walnut planted in 1986 and chestnut planted in 1995 in sub-optimal conditions shows that there may be considerable potential for limited products from specific varieties under conditions of special management. The aim of this paper is to characterise the conditions required for full scale trials based on current findings in terms of agronomic trials and economic considerations.

Materials and methods

Two walnut agroforestry trials were planted in 1986. One was planted in Buckinghamshire and the other in the county of Essex. The trials consisted of German walnuts of five varieties ('26', '120', '139', '286' and '1247') planted at spacings of 10 x 10 m (100 stems/ha) in a randomised (4 replicates) block design of 20 trees by 10 trees. The design was balanced for the effects of nearest neighbour in order to allow the site to be assessed as a variety trial. Two guard rows of trees were designated along the short axis and one along the long axis. The trials where established in arable fields and arable cropping was maintained for over 10 years in a central alleyway of 8 m. Full details of the Buckinghamshire trial are in Newman (2005). Hand harvesting of green walnuts for pickling was carried out during June-July. Minimal management of trees has been carried out over the life of the trial.

Observation plots of sweet chestnut trees were planted in Devon at 8 to 12 m apart in 1995. Two trees of each variety given below were planted apart from 4 trees of Marigoule and 5 trees of Belle Epine. Varieties can be classed as Marrons or Châtaignes. Marrons have a kernel which is not completely split by the pellicle into sub-kernels. Châtaignes have pellicles partitioning the nuts making it harder & more work to get usable nut pieces out.

Early season:

- Marigoule (Marron)
- Verdale (Marron)
- Vignols (Good pollinator)

Early-mid season:

- Marron Comballe (Marron)
- Précoce Migoule (Good pollinator)

Mid season:

- Bouche de Betizac (Marron)
- Marron Goujounac (Good pollinator, Marron)
- Marsol (Marron)

Mid-late season

- Belle Epine (Good pollinator, Marron)
- Bournette (Marron)
- Marlhac (Marron)
- Marron de Lyon (Doree de Lyon)

Late season

- Maridonne (Marron)

Hand harvesting of nuts was carried out during September to October. Minimal management of trees has been carried out over the life of the trial.

Yields

Walnut performance in 1996 is shown below in Table 1.

Chestnut performance for 2005 is shown below in Table 2.

Table 1. Mean performance per tree of four varieties (120, 1247, 286, and 139) in 1996 (The significance of any difference (p) was assessed by one-way analysis of variance

Variable	120	1247	286	139	p
Yield per ha of green nuts (t fresh mass ha^{-1})	0.37	0.25	0.65	0.87	NS
Yield of green nuts per unit canopy area (g fresh mass m^{-2})	399	203	581	512	0.001
Canopy area (m^2)	9.14	12.82	9.78	10.56	NS
Trunk diameter (cm)	6.8	8.1	6.5	7.2	0.023

Nut production

Table 2. Chestnut yield of six varieties in 2005 assuming 100 stems per ha

Variable	Belle Epine	Bouche de Betizac	Bournette	Marigoule	Marlhac	Vignois
Yield per ha of green nuts (t fresh mass ha^{-1})	0.65	2.40	3.50	1.90	4.75	2.75

Products and potential income

For walnut the most lucrative product appears to be the green nuts for pickling. A target yield of 1 tonne per hectare by using the best varieties under good management does not appear to be unreasonable. Current prices are £1.20 per kg. This would give a gross income of £1200 per hectare. Nuts for the table would give a higher income but pest control may prove costly. Walnut oil is high value product to be considered. No production data are available at present for UK conditions.

For chestnut the most lucrative product appears to be fresh nuts for the table. A target yield of 2.5 tonne per hectare by using the best varieties under good management does not appear to be unreasonable. Current prices are £2.60 per kg wholesale. This would give a gross income of £6500 per hectare. Other potential products include dried nuts and flour. No production data are available at present for UK conditions.

Reflections on costs and management systems

The largest cost in terms of annual inputs relates to hand picking. Assuming a picking rate of 6 kg per hour at a cost of £6 per hour gives a cost of £1 per kg. This would give a profit of £200 per hectare for walnut and £4000 for chestnut. The second largest cost is that of the trees which have to be imported and cost between £20 and £35 each. Currently there are no grants to cover these costs.

It is clears that most public interest in these systems is for mixed species orchards under organic management. No insect problems have been identified in any of the trials but both walnut and chestnut have been affected by fungal disease in some years which has affected yields. Chestnut however appears more resilient than walnut in this regard.

Reflections on climate change

Late spring frosts and the number of degree days have not been a problem in any of the trials. Climate change in the UK could be a double edged sword increasing growth through an increase in thermal time but also increasing the chance of fungal disease by warm and moist conditions in autumn and other critical periods.

A major factor underlying yield variation is flower phenology. This is a complex process depending on climate in the current year and the year before. The complexity of this may be such that modelling may not be an appropriate approach until multi-location trials are established that would give some insights into key variables.

Initial conclusions

Chestnut, and to a lesser extent walnut, has shown potential for further testing in multi-location variety trials using a protocol approach such as that used in the UK silvopastoral trials.

Whilst agroforestry may be a useful catch-cropping approach, the high investment costs and the high potential income from the trees means that short season high value intercrops may be preferable than long term arable or silvopastoral approaches.

The high nitrogen requirement of nut based systems (nuts contain high N and their removal is a major loss to the system) indicates great potential for integration with poultry or duck/geese systems.

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Reference

Newman, S.M. (2005) Agronomic and economic aspects of walnut agroforestry in the UK. Acta Horticulturae (ISHS) 705: 65-67. http://www.actahort.org/books/705/705_6.htm. (URL verified 18 December 2006).

Figures

Plate 1 Walnuts at harvest time

Plate 2 Walnut products from France

Plate 3 Part of the chestnut trial

Plate 4 Marrons and chataignes

Plate 5 Nut characteristics of different varieties