

Project title: Evaluation of six black raspberry cultivars

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Previous report:

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The results and conclusions in this report are based on an investigation conducted over a one-year period. The conditions under which the experiments were carried out and the results have been reported in detail and with accuracy. However, because of the biological nature of the work it must be borne in mind that different circumstances and conditions could produce different results. Therefore, care must be taken with interpretation of the results, especially if they are used as the basis for commercial product recommendations.

AUTHENTICATION

We declare that this work was done under our supervision according to the procedures described herein and that the report represents a true and accurate record of the results obtained.

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CONTENTS

Grower Summary	
Headline	1
Background and expected deliverables	1
Summary of the project and main conclusions	1
Financial benefits	2
Action points for growers.....	2
Science Section	
Introduction	3
Materials and methods.....	4
Discussion and conclusions	6
Knowledge and Technology Transfer	7
References.....	7

Grower Summary

Headline

Four black raspberry cultivars are being grown in East Kent and their canes and fruit will be assessed in 2011.

Background and expected deliverables

The black raspberry is a member of the *Rosaceae* family and belongs to the same subgenus (*Idaeobatus*) as the red raspberry (*Rubus idaeus* L.), with which it shares the trait of its fruit separating cleanly from the receptacle. Black raspberry (*R. occidentalis* L.) production has traditionally been concentrated almost completely in Oregon in the USA. 'Munger' and 'Jewel' are the leading varieties. Munger was bred in the 1890s and Jewel in 1957 (Graham and Jennings, 2009). However, since the early 1900s, black raspberry production in the United States has seen a marked decline that many attribute to disease and a lack of cultivars with sufficient disease resistance. At the same time, breeding progress has slowed dramatically due to an apparent lack of genetic variability in available elite germplasm. Interest in black raspberries has been growing in recent years in a number of countries from the USA to South Korea (Graham and Jennings, 2009) because of their high anthocyanin content and antioxidant capacity. New cultivars, which are adapted to the biotic and abiotic stresses of the Pacific Northwest, may help expand the market for black raspberry fruit and improve the financial return to the growers.

The aim of the work described here was to obtain cultivars of black raspberry for trialling in the UK to identify whether any of the tested cultivars showed promise for commercialisation. The four cultivars that were obtained are described below. These descriptions are based on experience of growing the varieties in the USA and data from UK based trials are needed.

Summary of the project and main conclusions

The first stage of the project was to collect the cultivars and propagate them. Haut, Huron and Jewel were sourced from SCRI in January 2009. Mac Black was supplied by Edward Vinson Ltd., Faversham, Kent. The mother plants were potted up into 10L black pots using a coarse peat based potting compost (Sinclair SHL Potting growing medium) in April 2009. The canes were allowed to develop during the early part of 2009 until cane height reached 2m. At this point the layering process was initiated. Canes were laid onto 8cm x 2.5m trays containing sowing compost (Sinclair SHL Sowing compost). The canes were pinned in place and the compost maintained damp whilst the canes began to produce roots. The

rooted canes were cut into 5cm sections and allowed to develop long canes during 2010. to be cropped in a commercial raspberry tunnel in 2011.

Financial benefits

- At this stage no financial benefits can be identified.

Action points for growers

- At this stage there are no action points for growers.

Science Section

Introduction

Black raspberries were first domesticated around 1832 with the variety 'Ohio Everbearer', which was selected from the wild near Lake Erie. Native to eastern North America from the Carolinas west to Arkansas and eastern Oklahoma and north to Ontario and New Brunswick, black raspberries typically are found in disturbed habitats and near forest edges and have a generally more southerly distribution than *Rubus idaeus* (Jennings, 1988).

The black raspberry is a member of the *Rosaceae* and it belongs to the same subgenus (*Idaeobatus*) as the red raspberry (*Rubus idaeus* L.), with which it shares the trait of its fruit separating cleanly from the receptacle (Jennings, 1988).

Black raspberry (*Rubus occidentalis* L.) production has traditionally been concentrated almost completely in Oregon. 'Munger' and 'Jewel' are the leading cultivars with 'Munger' being bred in the 1890s and 'Jewel' in 1957 (Graham and Jennings, 2009).

Since the early 1900s black raspberry production in the United States has seen a marked decline that many attribute to disease and a lack of cultivars with sufficient disease resistance. At the same time breeding progress has slowed dramatically due to an apparent lack of genetic variability in available elite germplasm. For example 'Munger' has served the industry surprisingly well bearing in mind it was selected over 100 years ago, but growers are experiencing increasing problems due to high disease pressure affecting yield and longevity of plantings. Since 1975 only three cultivars have been released: 'Haut', which is of pure *R. occidentalis* ancestry (Daubeny, 1997); 'Earlysweet', which has a *R. leucodermis* genotype as a grandparent (Galletta *et al.*, 1998) and is the first cultivar to have a species other than *R. occidentalis* in its ancestry; and 'Mac Black', which is of unknown ancestry, although it is suspected to have purple raspberry, and therefore *R. idaeus*, in its background (Finn, pers. comm., cited in Jennings, 1988). The yield of 'Munger' in Oregon has averaged only 2,845 kg·ha⁻¹ over the past 5 years and demonstrates the need for new varieties to be selected to replace these older varieties which do not appear to be performing adequately.

Interest in black raspberries has been growing in recent years in a number of countries from the US to South Korea (Graham and Jennings, 2009) because of their high anthocyanin content and antioxidant capacity. New cultivars, which are adapted to the biotic and abiotic stresses of the Pacific Northwest, may help expand the market for black raspberry fruit and improve the financial return to the growers.

The aim of the work described here was to obtain varieties of black raspberry for trialling in the UK to identify whether any of the tested varieties showed promise for commercialisation.

Whilst the four varieties that were obtained are described below, these descriptions are based on experience of growing the varieties in the US and data from UK based trials are needed.

Haut [Manteo x (Bristol x Bristol)] From Maryland. Medium sized, firm fruit ripens over a long period. Plants are vigorous with good productivity.

Huron (Rachel x Dundee) From New York. Medium sized fruit is firm and glossy. Canes are vigorous moderately hardy and moderately resistant to anthracnose. Lawrence (1979) also described Huron as originating from New York, as a late midseason variety with large glossy firm berries with vigorous canes.

Jewel originated in 1954 from a cross between New York 29773 (Bristol x Dundee) x Dundee (Fig. 3). It was selected in 1957 from a population of 104 seedlings and tested in New York. The plant is vigorous, erect, hardy and said to be consistently productive. The fruit ripens in mid-season and is large with glossy black skin but has a slight bloom. One issue is that it tends to produce a tight cluster of fruit at the tip of laterals which could make picking difficult (Ourecky and Slate, 1973).

Mac Black (parentage unknown) From Michigan. Ripens medium large berries 7-10 days later than most cultivars. Fruit is somewhat soft. Canes are vigorous, erect, and hardy.

Materials and methods

The aim of the project was to trial 30 plants of six varieties in a polytunnel arranged in a completely randomized block design with 3 replicates of 10 plants each. The first stage of the project therefore was to collect the varieties and propagate them so as to produce the 30 plants required of each variety. Haut, Huron and Jewel were sourced from SCRI in January 2009. Mac Black was supplied by Edward Vinson Ltd., Faversham, Kent.

The mother plants were potted up into 10L black pots using a coarse peat based potting compost (Sinclair SHL Potting growing medium) in April 2009. The plants were placed in an unheated glasshouse at Brogdale Farm, Faversham, Kent. Watering was through 2l/h drippers (one per pot) using a Dosatron DI3 diluter to dilute a concentrated tank of dissolved fertilizer to obtain an EC of 1.4mS.

The canes were allowed to develop during the early part of 2009 until cane height reached 2m. At this point the layering process was initiated. Canes were laid onto 8cm x 2.5m trays containing sowing compost (Sinclair SHL Sowing compost). The canes were pinned in place and the compost maintained in a damp state whilst the canes began to produce roots (Figure 1).



Figure 1. Canes were bent onto a bench on which trays containing sowing compost was placed. Root development down the length of the cane then occurred.

On 4th January 2010, the canes were removed from the layering trays and cut into 5cm sections. Each section consisted of a 5cm length of cane plus the root system developed by that cane (Figure 2). These sections were then potted into 1L pots using a coarse peat based potting compost (Sinclair SHL potting compost) and placed in an unheated glasshouse at Brogdale Farm, Faversham, Kent.



Figure 2. Root development from a node on the cane of Jewel. Photograph taken in January 2010.



Figure 3. The sections of canes being potted into 1L pots using a coarse potting compost.

20 – 25 'long canes' of each variety had been produced which were then transferred to Gaskains Ltd. in February 2011 for cropping. The plants were placed in a Spanish tunnel at a density of three pots per metre row. Watering was carried out by Gaskains Ltd. using a raspberry feed applied through 2l/h drippers designed to apply the following ratios of elements N - 3:P – 1: K – 5: Ca – 3: Mg – 0.7.

During 2011 the plants will be harvested and records of yields, fruit size, fruit quality and shelf life will be made. The growth of the canes will also be assessed.

Discussion and conclusions

In 2011, the varieties will be assessed for yield, fruit quality, growth etc. Whilst the reports from the US do suggest sensitivity to diseases, this was not apparent in the propagation phase of these varieties. The plants all grew well and showed strong vigorous growth. The level of thorniness of all the varieties was significant and will present difficulties, particularly when pruning or training the canes. The layering technique worked well and allowed long canes to be propagated from a small number of mother plants. These canes were over 3m tall when moved to the tunnel and so had to be tipped. This just demonstrates the vigour of these canes.

The plants will be grown during 2011 in a commercial tunnel at Gaskains Ltd, Selling allowing a full commercial evaluation of the canes to take place.

Knowledge and Technology Transfer

During 2011, the varieties will be presented to the HDC raspberry variety trial walk held in July.

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