Grower Summary

SF 012 (GSK194)

Winter chilling requirements of blackcurrants:

An assessment of the chilling requirements for a range of cultivars at the Bradenham Hall trial site

Final 2004

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Further information

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GROWER SUMMARY

COMMERCIAL BENEFITS OF THE PROJECT

By assessing the chilling response of existing and potential cultivars in a formalised manner, it will be possible to predict their performance in seasons where low levels of chilling may be received. It is possible that with the onset of global warming, warmer winters could be more frequent and the selection of cultivars with a low winter chill requirement will be important.

BACKGROUND AND OBJECTIVES

There is increasing evidence that the amount of cold experienced by blackcurrant cultivars, in some regions, in some winters, is inadequate, leading to delayed and uneven bud break, with consequent adverse effects on yield and quality.

Following assessment of the chilling response, at the end of the trial it will be possible to rank all of the cultivars that are growing at the Bradenham Hall trial site, with respect to their winter chilling requirement. This information, taken together other parameters, will help growers to assess the suitability of a given cultivar for growing on a given site.

SUMMARY OF RESULTS AND CONCLUSIONS

Branches from each cultivar in the trial were cut twice weekly from January to March 2003 and 2004, and kept at 20°C for 21 days. Branches were assessed using 75% bud break as the criteria for the chill requirement having been met, the heat units required for further development were recorded from point of chill achievement to mid flower.

Table 1: Cultivar Chill and Heat Unit Requirement 2003/4

Row	Cultivar	Date sufficient chill received for 75% bud break		Chill Units		Heat Units		50% Flower	
		2003	2004	2003	2004	2003	2004	2003	2004
32	9032-1	16/1/03	13/1/04	1331	1312	318.9	280.7	18/4	19/4
22	88111-4	20/1/03	16/1/04	1409	1370	312.5	328.1	18/4	26/4
31	Ben Gairn	20/1/03	19/1/04	1409	1440	312.5	326.7	18/4	26/4
21	Ben Hope	28/1/03	23/1/04	1577	1495	313.0	361.6	20/4	3/5
23	8922-11	28/1/03	16/1/04	1577	1370	290.9	328.1	18/4	26/4
9	S18-10-18	31/1/03	9/2/04	1647	1721	343.0	251.0	23/4	26/4
12	8944-13	3/2/03	3/2/04	1719	1683	342.6	239.2	23/4	19/4
18	8972-1	3/2/03	3/2/04	1719	1683	289.4	290.2	18/4	26/4
5	903-1	13/2/03	13/2/04	1918	1765	365.2	267.2	28/4	30/4
17	Baldwin	13/2/03	6/2/04	1918	1683	237.6	259.9	15/4	26/4
36	8999-9	13/2/03	30/1/04	1918	1657	299.1	309.2	20/4	26/4
27	Ben Dorain+	17/2/03		2014		-		-	
30	896-4	17/2/03	9/2/04	2014	1721	329.3	200.1	23/4	19/4
14	S18-25-20+	21/2/03		2104		-		-	
15	S30-13-35	21/2/03	17/2/04	2104	1824	327.0	256.3	23/4	30/4
24	Ben Lair+	21/2/03		2104		-		-	
3	8814-2	24/2/03	1/3/04	2157	2119	321.2	194.1	23/4	23/4
26	Ben Avon+	24/2/03		2157		-		-	
28	894-2	24/2/03	16/1/04	2157	1370	309.6	277.1	22/4	19/4
33	8949-15	24/2/03	17/2/04	2157	1824	320.7	177.6	23/4	19/4
20	Ben Lomond	28/2/03	17/2/04	2221	1824	309.6	256.3	23/4	30/4
2	8962-1	3/3/03	12/3/04	2250	2348	481.9	312.5	8/5	13/5
35	8942-5	3/3/03	1/3/04	2250	2119	299.0	249.8	23/4	30/4
37	8966-9	3/3/03	17/2/04	2250	1824	287.8	256.3	22/4	30/4
4	871-5	7/3/03	12/3/04	2296	2348	318.6	258.4	28/4	3/5
8	8982-6	7/3/03	17/2/04	2296	1824	385.6	276.3	2/5	3/5
10	S18-3-70	7/3/03	22/3/04	2296	2436	441.6	243.5	6/5	10/5
11	S18-2-23	7/3/03	1/3/04	2296	2119	441.6	306.3	6/5	10/5
7	8986-13	10/3/03	1/3/04	2328	2119	307.1	249.8	28/4	30/4
19	8955-2+	10/3/03		2328		-		-	
38	Ben Tirran	14/3/03	8/3/04	2397	2260	428.2	243.3	7/5	15/5
39	Ben Alder	24/3/03	13/2/04	2550	1765	396.2	323.6	7/5	10/5
40	Ben Vane		1/3/04		2119				

Chill Units – Total number of hours below 7°C recorded from 1st October 2002 to the date on which sufficient chilling had been received for >75% bud break after 21 days at 20°C

Heat Units – Total number of day degrees (base temperature 4^{o}C, hourly averaged) accumulated from the date of sufficient chill to the date of 50% flower open in the field.

At the start of the 2004 recording period, 16 January, slightly more chill units had been recorded in 2004 (1370) than in 2003 (1331). Subsequently, however, fewer chill units were accumulated in 2004 than in 2003, so that by 24 February, 2157 units were recorded in 2003, and 1978 units in 2004. At the end of the period, by 24 March, 2550 units were recorded in 2003 and 2478 in 2004. Although average temperatures in January and February were respectively 1 and 2 deg C warmer in 2004 compared with 2003, March average temperatures were cooler in 2004 by 0.8 deg C compared with 2003. In spite of this, more chill units were recorded in March 2003 compared with March 2004. Although there were fewer hours <7 deg in March 2004, the overall temperature was lower.

For most cultivars the chill unit requirement was broadly similar, albeit slightly lower than that recorded in 2003, and a similar ranking resulted. There were however two cultivars that appeared to differ markedly in response between the two years. Ben Alder and 894-2 required respectively 37% and 31% fewer chill units in 2004 compared with 2003. Taking into account the results from 2003 an average chilling requirement was derived for the two years studied.

ACTION POINTS FOR GROWERS

- Cultivars Ben Gairn, Ben Hope, 9032-1, 88111-4, 8922-1, S18-10-18, 8944-13, and 8972-1 could be classified as having a low winter chill requirement and would be suitable for use in areas of minimal winter chill.
- Cultivars Baldwin, 894-2, 8999-9, , 903-1, 896-4, S30-13-35 and 8949-15 could be classified as having a low moderate winter chill requirement
- Cultivars Ben Lomond, Ben Dorain, Ben Alder, Ben Vane, Ben Lair, 8966-9, 8982-6, S18-25-20, 8814-2 and 8942-5 could be classified as having a moderate high winter chill requirement and would be likely to under perform on occasions in areas where minimal winter chilling is likely to be received.
- Cultivars Ben Tirran, S18-2-23, 8986-13, 8962-1, 871-5, 8955-2,S18-3-70, could be classified as having a high winter chill requirement and should not be planted in areas where minimal winter chilling is likely to be received.

Table 2: Cultivar Ranking - Average of 2003/4

Row	Cultivar	Average Chill Unit Required 2003/4
32	9032-1	1321.5
22	88111-4	1389.5
31	Ben Gairn	1424.5
23	8922-11	1463.5
21	Ben Hope	1526
9	S18-10-18	1684
12	8944-13	1701
18	8972-1	1701
28	894-2	1763.5
36	8999-9	1787.5
17	Baldwin	1800.5
5	903-1	1841.5
30	896-4	1867.5
15	S30-13-35	1964
33	8949-15	1990.5
27	Ben Dorain+	2014
20	Ben Lomond	2022.5
37	8966-9	2037
8	8982-6	2060
14	S18-25-20+	2104
24	Ben Lair	2104
40	Ben Vane	2119
3	8814-2	2138
26	Ben Avon+	2157
39	Ben Alder	2157.5
35	8942-5	2184.5
11	S18-2-23	2207.5
7	8986-13	2223.5
2	8962-1	2299
4	871-5	2322
19	8955-2+	2328
38	Ben Tirran	2328.5
10	S18-3-70	2366

+ These cultivars were grubbed due to reversion before completion of the trial, only 2003 results are available.

ANTICIPATED PRACTICAL AND FINANCIAL BENEFITS

The winter chill ranking could be used to decide suitability of existing and potential new cultivars for planting in areas with different winter climates. Planting unsuitable cultivars can result in uneven bud break, uneven ripening and poor yields.