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CROSS-FERTILIZATION ON BLACKCURRANT (*Ribes nigrum* L.) PLANTATION

ABSTRACT. Material for the research was obtained from an experimental plantation set up in 1995. It consisted of 7 rows with 37 plants each. The field was mainly planted with green-fruited *Ribes nigrum* L. selection No. 27/75-6 (genes *vv*). Also, in the centre of the middle row there were 5 bushes of black-fruited cv. 'Titania' (genes *VV*), as a source of pollen for its further detection in a progeny. In 1997, 1998 and 1999 beehives were brought before flowering. During the three years in July samples of fruit were collected from 15 points of the plantation including 'Titania'. In the following years a hundred seedlings from each sample were produced and planted in a field. All seedlings of 'Titania' were black-fruited (*VV* or *Vv*). Seedlings of No. 27/75-6 were mainly green-fruited (*vv*, i.e. result of selfing), and no more than several per cent were black-fruited (*Vv* – result of pollination with 'Titania').

Key words: blackcurrant, pollination

INTRODUCTION. How to detect cross-fertilization in the field? In this experiment fruit colour – black *vs* green, was chosen as a marker in a progeny. A single dominant gene controls black fruit colour. It is

known as *Rb* (Keep and Knight, 1970) or *V* (Junnila and Hiirsalmi, 1987). Homozygous recessive plants *rb/rb* (or *vv*) are green-fruited.

MATERIAL AND METHODS. In 1995 at Skierniewice an experimental plantation was set up with 7 rows with 37 plants each, spaced 2.5 x 0.5 m. It consisted of green-fruited *Ribes nigrum* L. selection No. 27/75-6, and 5 bushes of black fruited cv. 'Titania' in the very centre. Selecion No. 27/75-6 is a seedling from self-pollination of 'Ojebyn', bread by the author at the Research Institute of Pomology and Floriculture, Skierniewice. In 1997-1999 at the beginning of flowering 2 beehives were brought to promote cross-pollination. Every year samples of fruit were collected from 15 bushes (Fig. 1).

G	G	G	**G – 9**	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	**G – 8**	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	**G – 7**	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	**G – 6**	G	G	G
G	G	G	T	G	G	G
G	G	G	T	G	G	G
G – 10	**G – 11**	**G – 12**	**T – 5**	**G – 13**	**G – 14**	**G – 15**
G	G	G	T	G	G	G
G	G	G	T	G	G	G
G	G	G	**G – 4**	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	**G – 3**	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	**G – 2**	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	G	G	G	G
G	G	G	**G – 1**	G	G	G

G – green-fruited selection No. 27/75-6 (genes *vv*);T – black-fruited cv. 'Titania' (genes *VV*);
1-15 – bushes from which the samples of fruits for seeds were collected

Figure 1. Field map of the experimental plantation

From their seeds seedlings were produced in a glasshause. From each of the 15 samples 100 seedlings were planted out in the following year, which produced fruit after 1-3 years. The data were statistically processed by an analysis of variance. Duncan`s multiple range t - test at P=0.05 was used to evaluate the differences between mean values. Each of the three years of the experiment was treated as a replication.

RESULTS. The results from the 3 year experiment are presented in Table 1. All seedlings of 'Titania' (T-5) were black-fruited as well as some of those from open pollination of green-fruited selection No. 27/75-6. The latter were received from cross-pollination by pollen grains brought from 'Titania'. The means of 3 years show that 0.7-8.7% of seeds of No. 27/75-6 were developed from pollination with 'Titania' pollen. On the bushes not adjacent to the pollinator only 0.7-3.3% of seeds were of hybrid origin. The level of cross-fertilization was significantly higher only on bushes G-4 and G-6 – growing next to the pollinator. In particular years the detected cross-fertilization ranged from 0 to 16%.

Table 1. Percentage of black-fruited seedlings received from seeds collected from different plants (see Fig. 1) in 1997 (A), 1998 (B) and 1999 (C)

No. of sample	A	B	C	Mean
1	5	0	0	1.7 a *
2	4	0	0	1.3 a
3	3	1	3	2.3 a
4 (bush adjacent to 'Titania')	7	3	16	8.7 b
5 ('Titania')	100	100	100	100.0
6 (bush adjacent to 'Titania')	13	5	6	8.0 b
7	1	1	0	0.7 a
8	3	0	0	1.0 a
9	3	2	3	2.7 a
10	3	0	2	1.7 a
11	2	0	0	0.7 a
12 (row adjacent to 'Titania')	5	4	1	3.3 a
13 (row adjacent to 'Titania')	4	0	1	1.7 a
14	7	1	1	3.0 a
15	2	3	0	1.7 a

* Means followed by the same letter don't differ significantly at P=0.05, Duncan's multiple range t - test

DISCUSSION. All seedlings of selection No. 27/75-6 from self-pollination were green-fruited (unpublished data), so those black-

fruited of the same selection received in the experiment could have come only from cross-pollination with 'Titania' pollen. In this trial cross-fertilization was rather scarce not only between distant plants, but also between those growing next to each other: G-4 – 'Titania' – G-6 (Fig. 1). Under different conditions the cross-fertilization could be much higher. From seeds of selection No. 27/75-6 growing in blackcurrant collection, in 1990 the author received up to 45% of black-fruited seedlings (unpublished data). In spite of close neighbourhood of plum and sweet cherry trees, bees frequently visited blackcurrant bushes (0.8 bee/bush/min). In spite of low cross-fetilization, bushes of No. 27/75-6 fruited very well in the experiment, as a result of a high level of self-pollination and self fertility. The level of cross-pollination is now undetectable.

To receive results by this method we need few years and they are not accurate because of lethal gene acting (Keep and Knight, 1970; Junnila and Hiirsalmi, 1987). Thus other methods are needed to be developed. Therefore, plant material of different genotypes (*VV, Vv, vv*) from this experiment has been delivered to the Laboratory of Unconventional Breeding Methods. A method of DNA analysis enabled distinguishing green-fruited seedling from black-fruited ones much faster (Korbin et al., 2002). Now efforts are made there to distinguish black-fruited homozygous plants (*VV*) from heterozygous ones (*Vv*). If it succeed, we can recognise, how many seedlings of 'Titania' were of hybrid origin (*Vv*).

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