

Increased growth rate and effect of leaf disease control in sugar beet in DK and SE

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Introduction

Due to increase in attack of leaf diseases and increase in temperature, effect of leaf disease control and monthly growth rate from mid-August to mid-December 2006-2009 is measured in field trials in DK and SE. Results on growth rate are compared to results from 1970es-90es.

Main leaf diseases are *Ramularia* leaf spot, powdery mildew and beet rust. Sugar yield loss from these can extend up to 25 %.

Materials and methods

8 trials in DK and 11 trials in SE are conducted 2006 to 2009 using split plot design in 4 replications. Each year, trials are sequential harvested each month from mid-August to February. In treated plots fungicides are applied in a dose rate of 0.25 litre/ha 1, 2 or 3 times with an interval of 3 weeks starting from the first symptoms of leaf diseases (primo August). Opus (epoxiconazole, 125 g/l) is used in DK. Comet (pyraclostrobin, 250 g/l) is used in SE.

Discussion

Compared to results from earlier studies the growing season seems to have expanded into December. In average of 2006-2009 the growth rate seems to be higher than measured in earlier studies (Table 1). However the variation between years is now large; in 2006 the growth rate is measured to 49% while in 2007 it is 26%.

The growth rate tends to be highly influenced by the temperature and the length of the late growing season also influenced by the occurrence of frost in November. Hence where the risk of frost in November is higher, clamping is done from start November while direct deliveries are an option in the area where frost rare become severe.

Table 1. Growth rate in different periods.

| | 2006-2009 | | 1976-78 | 1977-96 |
|------------------|-----------|-------|---------|---------|
| | DK | SE | DK | SE |
| Sugar yield t/ha | | | | |
| Mid-September | 12,29 | 11,91 | 6,79 | 7,89 |
| Mid-November | | | 8,58 | 10,28 |
| Mid-December | 16,38 | 15,62 | | |
| Growth rate % | 33 | 31 | 26 | 30 |

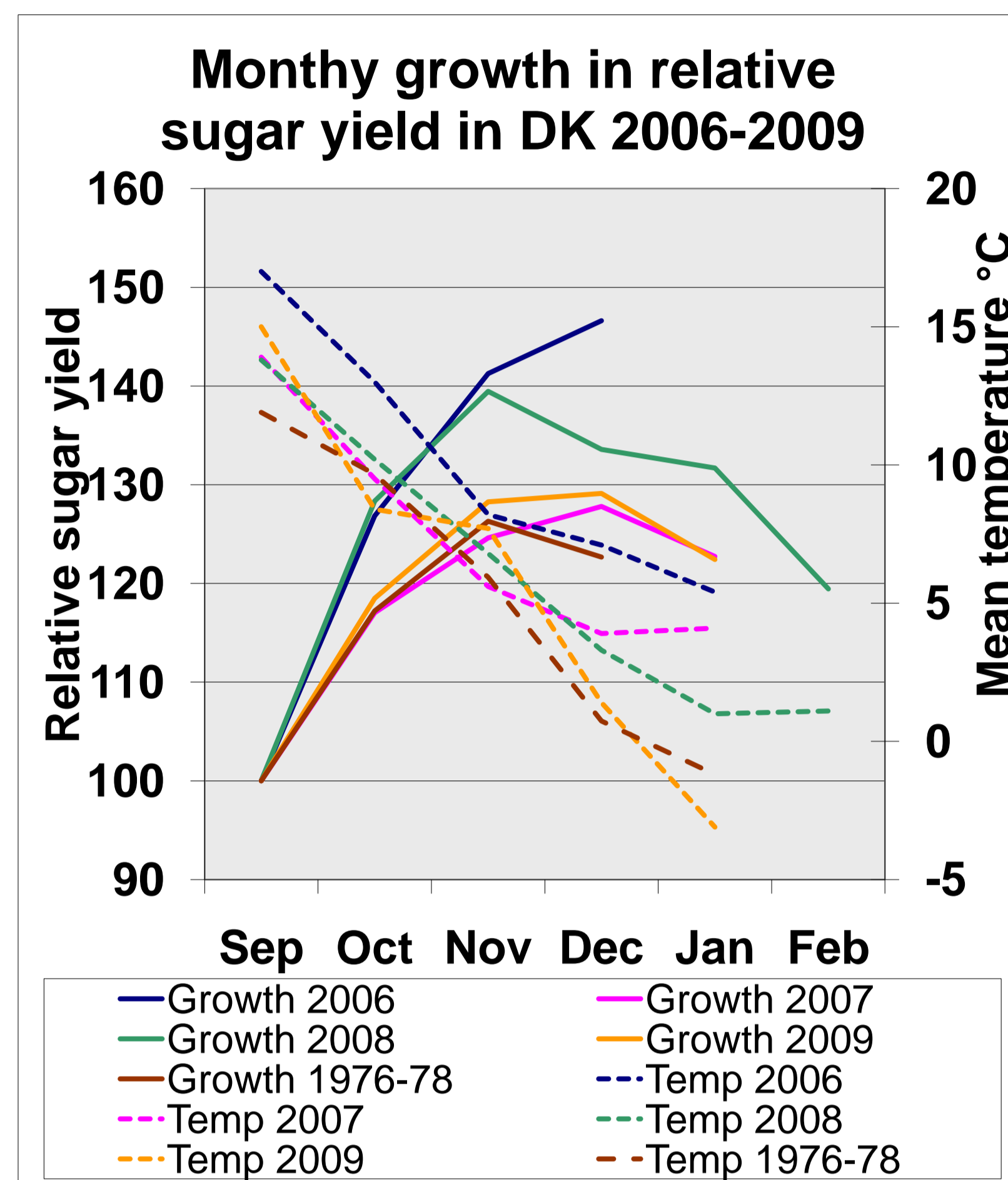


Figure 1. Growth rate and mean temperature from mid-September to mid-December 2006-2009, 2 trials per year DK. Sugar yield mid-September 2006: 9,72 t/ha, 2007: 12,63 t/ha, 2008:12,24 t/ha, 2009: 14,55 t/ha. 1976-78: 6,76 t/ha.

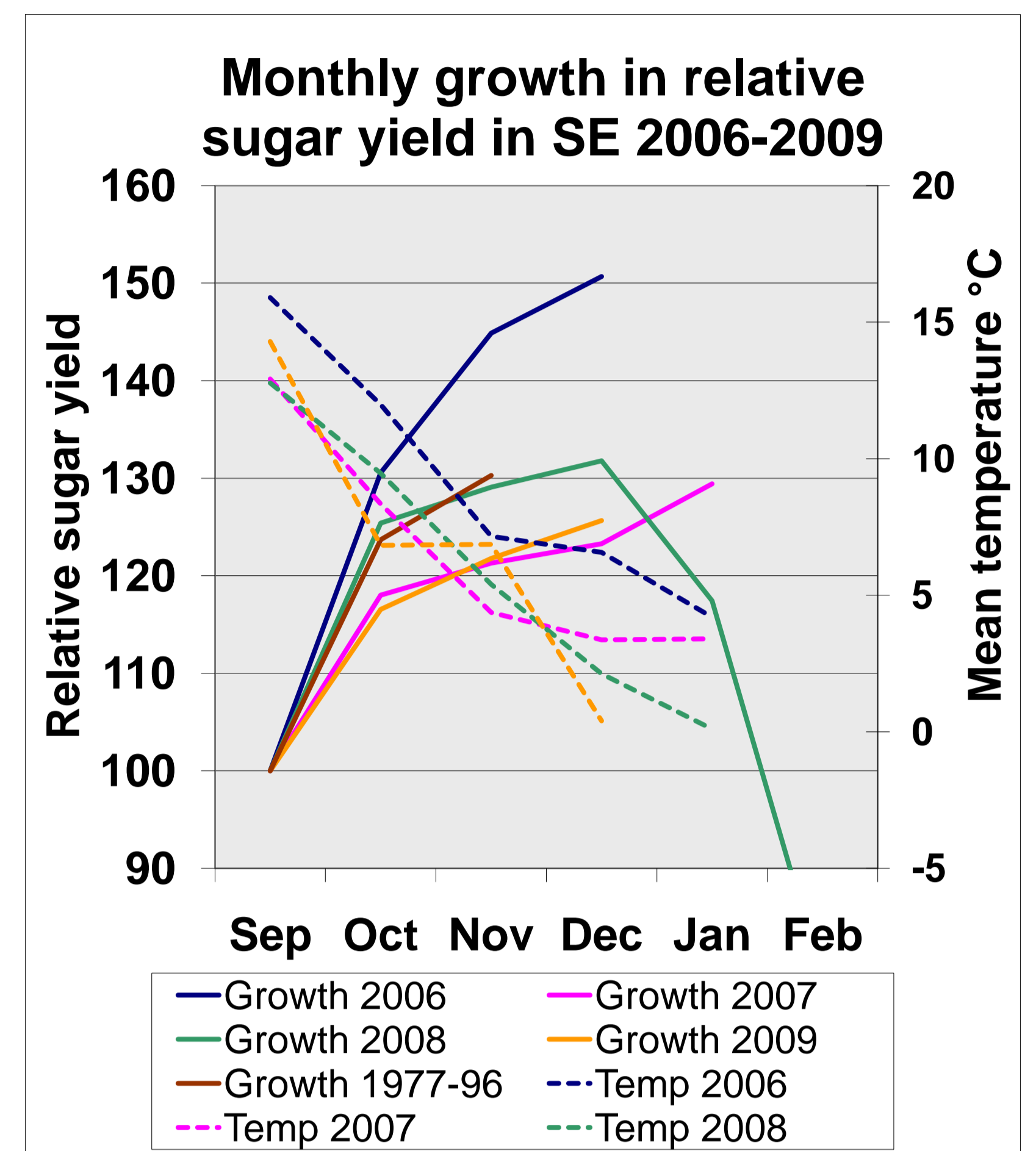


Figure 2. Growth rate and mean temperature from mid-September to mid-December 2006-2009, 2 - 3 trials per year SE. Sugar yield mid-September 2006: 8,86 t/ha, 2007: 12,79 t/ha, 2008: 12,44 t/ha, 2009: 13,49 t/ha. 1977-96: 7,89 t/ha.

Repeated applications of fungicides control powdery mildew, *Ramularia* leaf spot and beet rust and increase the leaf weight and sugar yield (Fig. 3). Due to differences in occurrence and severity of leaf diseases, control of leaf diseases increases the sugar yield with 7-10 % in DK while the similar increase in SE is 6-8 %. When harvested before middle of October one application results in the highest sugar yield. Harvesting later, three applications result in the highest sugar yield. However two applications provide the highest profit calculated by the net contribution (optimisation).

The advantage from fungicide treatments increases significantly in years with high temperature hence high growth rates, also requiring a higher number of fungicide applications for an optimal result.

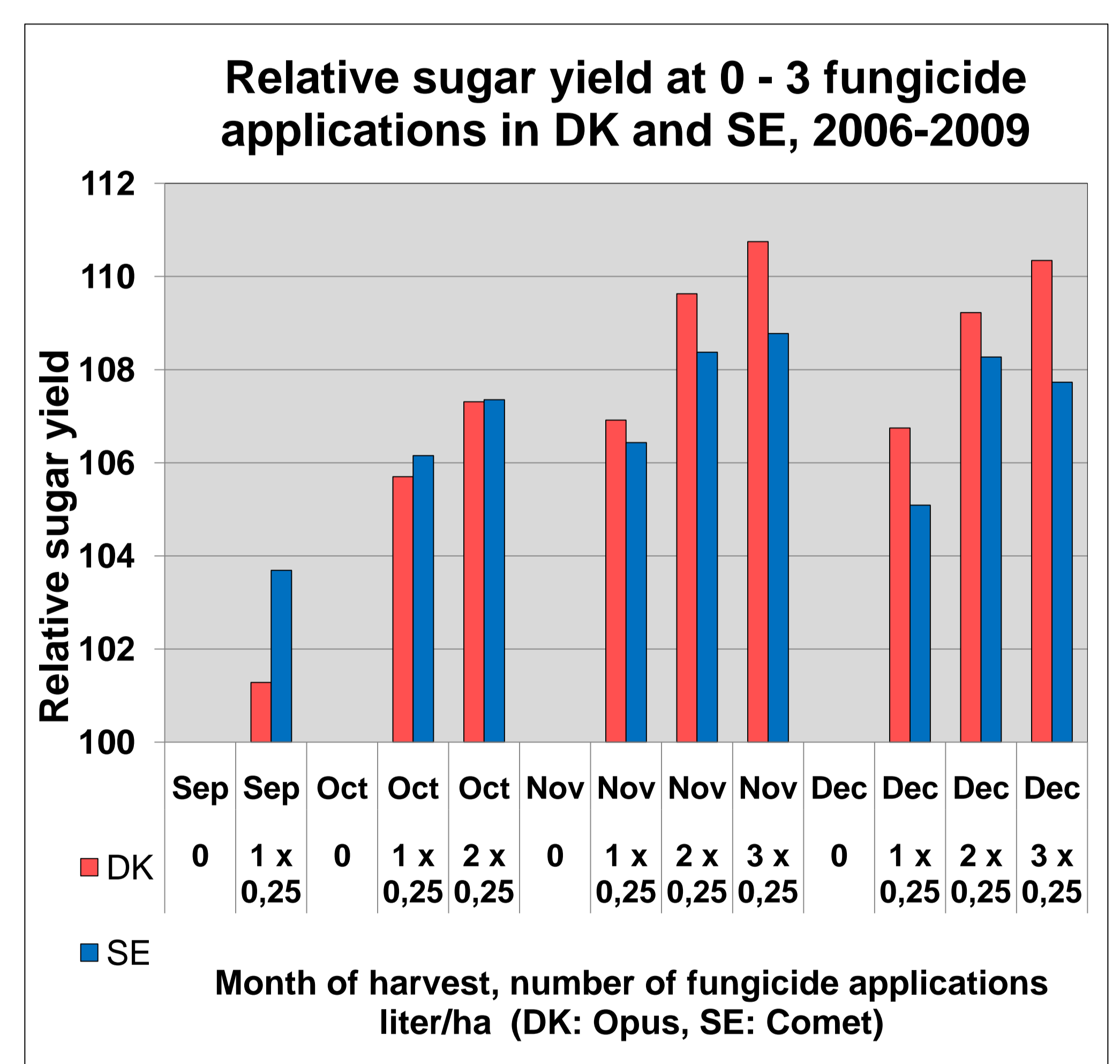


Figure 3. Effect of fungicide applications on relative sugar yield.



Photos. Knuthenborg 2009 mid-December. Beets untreated with fungicides (left) has less top than beets treated three times with 0,25 l/ha Opus (right). The treated beets with larger top may require more energy to maintain the top, why treated beets during a cold period in December and January may show a lower growth rate than untreated. Large top may on the hand protect the beets against early frost.