

Development of leaf area index and light interception of autumn-sown and spring-sown sugar beet

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Introduction

Leaf area index and light interception are essential for yield formation of sugar beet. In early spring the radiation is already intensive but it cannot be used by the sugar beet plants due to the late sowing date and the slow leaf formation during early growth. If it would be possible to reach a high leaf area index earlier in the year, enhanced light interception may increase taproot and sugar yield. One possibility to reach this aim is to sow earlier.

This study aimed at determining to what extent sowing of sugar beet in autumn can improve light interception compared to spring-sown beet.

Determination of LAI



Material and Methods

- field trial in 2006/07 near Göttingen
- 6 sowing dates (3 in autumn and 3 in spring);
- 4 harvest dates
- determination of fresh and dry matter of leaves and taproots as well as leaf area index

Results

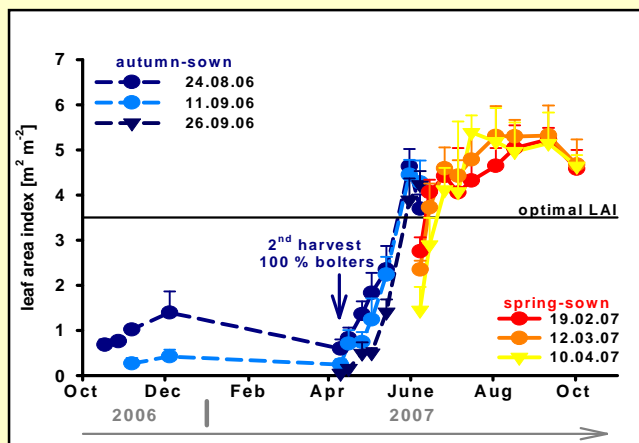


Fig. 1: Impact of sowing date on leaf area index of sugar beet during the season; Göttingen 2006/07

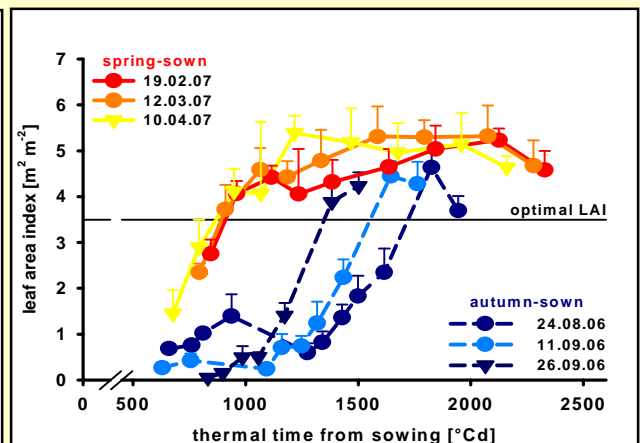


Fig. 2: Impact of sowing date on leaf area index of sugar beet as a function of thermal time above 3 °C from sowing Göttingen 2006/07

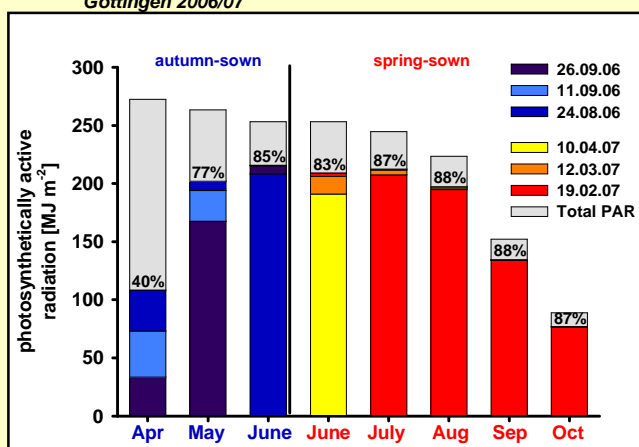


Fig. 3: Impact of sowing date on light interception of sugar beet during the season (calculated according to Röver 1995); Göttingen 2006/07; PAR = photosynthetically active radiation

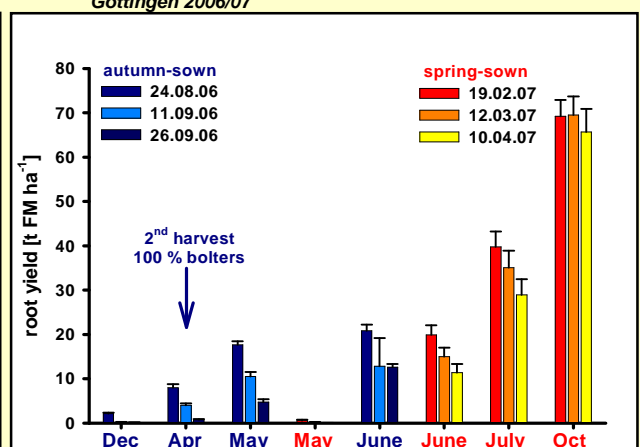


Fig. 4: Impact of sowing date on taproot yield of sugar beet during the season; Göttingen 2006/07

Conclusion

- One possibility to reach a high leaf area index earlier in the year is to sow sugar beet in autumn.
- Autumn-sown (August-sown) sugar beet can use 40 % of the incident radiation in April for yield formation, while spring-sown sugar beet are sown or emerging at this time.
- The earlier the sowing date the higher was the yield of beet at a given harvest date; in May yield of autumn-sown sugar beet was considerably higher than that of spring-sown beet.
- At the moment the main problem of autumn-sown sugar beet is bolting after winter which might be solved by bolting resistance.