Effect of agronomic factors on invert sugar accumulation in sugar beet

Martijn Leijdekkers

Introduction

Invert sugar formation in sugar beet:
ccleavage of sucrose by sucrolytic enzymes

Sucrose $\rightarrow$ Glucose + Fructose
Why important?

- derived from sugar → sugar loss
- undesired coloration and reduction of alkalinity reserve of factory juices
- indicator for increased levels of other undesired beet constituents (e.g. dextran, mannitol, raffinose)
- increased consumption of processing aids and energy and reduction of sugar yield

Analysis of invert sugar

Analysis of glucose content using a biosensor

Integrated in Dutch tarehouses since 2013
Analysis of invert sugar

- calculation of invert sugar from glucose content
- since campaign 2013/2014 routinely measured in all beet samples in The Netherlands and reported to growers; not (yet) in beet payment system

Factors affecting invert sugar content in sugar beet and control measures to minimize invert sugar accumulation
Deterioration after frost

Importance:

Control:

timely frost protection

Storage conditions

Importance:

Control:

- clamp management
- dry storage
- temperature control
Invert sugar vs degree days

Source: IRS storage trials, 2013

Root and crown rot

Importance:

Control:
right resistances / tolerances and agricultural practices
Heavily damaged beet and mould infestation

Importance:
★★★★☆

Control:
beet friendly harvesting and handling

Presence of green material

Importance:
★★★★☆

Control:
correct defoliation/topping at harvest
Variety

Importance:

★★★★

Control:

variety choice

(currently no information available on variety list)

Commercial variety differences

Source: IRS variety trials, NL, 2014
Other agronomic factors

e.g. drought stress, rhizomania, verticillium, nutrient deficiencies, foliar diseases

**Importance:**

☆☆☆☆☆
(to be confirmed)

**Control:**

right agricultural practices and resistances/tolerances

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**Fungal leaf infestation at harvest**

Source: IRS fungicide field trials, NL, 2015
Conclusions

- minimize invert sugar content to maintain acceptable technological quality of beet and low sugar losses
- growers are able to realize this by:
  - choosing the right agricultural practices and varieties
  - delivering good harvesting quality with minimal beet damage, green material and soil tare
  - paying attention to storage conditions
- including invert sugar in beet quality analysis provides valuable additional insight for beet growers into their delivered beet quality

Source: IRS storage trials, NL, 2014
Thank you for your attention!