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## **SUSTAINABLE INTENSIFICATION – SUGAR BEET CULTIVATION AS A CASE STUDY**

**Intensification durable, à l'instar de la betterave sucrière /  
Nachhaltige Produktivitätssteigerung am Beispiel der Zuckerrübe**

### **ABSTRACT**

Sustainable intensification is the political overall concept to meet future demands of global food security. This concept of a production system focuses on a maximum amount of resource factors optimized in its efficiency (input-output ratio). As a first approach, the sugar beet cultivation in Germany will be analysed in this context.

The most relevant output unit is sugar yield per ha. It has increased over the last decades by approx. 2% p.a. from which approx. 50% is due to breeding progress. This was gained by higher ratio (efficiency) of (i) chlorophyll content to leaf area, (ii) root to leaf dry matter and (iii) sugar to marc mass of the beet. The other 50% were gained first by higher leaf area duration and root yield in relation to more favorable weather conditions and second by a higher ratio of sugar yield to greenhouse gas emissions by improved cultivation management. Examples are (i) reduced N-input and, thus, decreasing N-balance, (ii) simultaneously decreasing soil organic C-balance and still significant N<sub>2</sub>O-emissions, (iii) pesticide input in accordance to guidelines of integrated pest management and (iv) decreasing environmental risk of pesticides application in accordance to the national action plan.

As an integrative concept across the entire supply chain of sugar production from beet, sustainable intensification also includes socio-economic aspects. Examples are (i) sector self-organized and financed research and knowledge transfer, (ii) farmers as stakeholders of the sugar industry, (iii) its importance for economic development of rural zones, (iv) the cultivation of sugar beet in crop rotations without any link to indirect land use change, (v) its relevance for biodiversity by the contrasting ecological behavior in relation to other crops and (vi) by-products providing added value (pulp/molasses) or recycling (lime). The relevance of these aspects have still to be quantified. Most important and more than ever before, sugar production from beet needs to improve its public image. Sustainable intensification proposes an excellent option to increase public perception and society's acceptance as a main production factor in the future.

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