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Emissions in Producing, Processing and Transporting Organic Bananas from the Dominican Republic

Agricultural products cause a number of sources of greenhouse gases from production through to sale in retail stores. Emission levels from production, transport and processing that affect the climate can differ greatly between different products. E.g. the agricultural production of organic bananas from the Dominican Republic contributes only 5% of the total greenhouse emissions. The remaining 20% comes from processing (ripening) and 75% from logistics. The cost of neutralising the accruing greenhouse gas emissions with carbon credits is approximately 1 cent per kilogram of bananas.

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Keywords

Greenhouse gas, bananas, emissions

The fourth UN climate report, which appeared in February 2007 [1], confirmed the correlation between the emission of anthropogenic greenhouse gas emissions (GHG emissions) and the warming of the earth. In the discussion of possible strategies to minimise these, increased reference was made to the inclusion of agriculture. Agricultural products cause, as a matter of course, emissions, which affect the climate, as a result of the cultivation of crops or the keeping of animals, storage, transport and possibly further processing. In order to assess such a relatioship, these data must first be recorded and documented. Based on this information, the potential for reduction can be deduced and utilised, or alternative processes can be established.

In the following, an account is given of GHG emissions from the production and marketing chain of organic bananas from the Dominican Republic, up to the point of their becoming available in retail shops. Consideration is given to the main sources of GHG emissions and theoretically conceivable possibilities of reduction are discussed.

Methods

The GHG emissions for the areas agricultural production, transport and processing were balanced for organic bananas from the Dominican Republic under study. This analysis was carried out making use of the operational data of a company handling organic products [2], as well as with the aid of the program GEMIS 4.3 [3].

The starting point of this analysis are the processes within the production and marketing chain listed in *Table 1*. For each process step, first of all, all data of relevance for calculating GHG emissions were recorded and calculated with the aid of GEMIS 4.3. At the same time, in addition to GHG emissions, which derive from the direct processes, those from the preceding chains were also recorded. The emissions from the preceding chains include those GHG emitted in the production and making available of expendable materials, such as fuels or other sources of energy, fertilisers and pesticides, as well as operating resources, such as lorries and ships. For the total balance of GHG emissions of the organic bananas, the GHG emissions for the individual process steps were finally combined.

Results

The supply of an organic banana from the Dominican Republic to retailers results in about 0.7 $kgCO_{2\text{-equivalent}}/kg_{banana}$. This is 75% attributable to transport, 20% to further processing and only 5% to agricultural production (*Fig. 1*). The largest individual source of GHG emissions is due to transport in refrigerated ships from the Dominican Republic to Europe with about 312 $gCO_{2\text{-equivalent}}/kg_{banana}$. Also a substantial proportion of the total amount of GHG is emitted during the ripening of bananas to the stage required by consumers, in special ripening chambers, amounting to 133 $gCO_{2\text{-equivalent}}/kg_{banana}$. The total process of agricultural production, in contrast, results in only 37 g $CO_{2\text{-equivalent}}/kg_{banana}$.

Discussion

The analysis indicates that optimising agricultural production would only have a small

Table 1: Proportionate GHG emissions per kg banana by agricultural production, transport and processing of Dominican bananas from organic farming

Area	GHG-Emissions (g $CO_{2\text{-equiv}}/kg_{banana}$)
Agricultural production	
Plant protection	13.2
Organic fertilisation	9.1
Mineral fertilisation	6.8
Irrigation	7.8
Total (agricultural production)	***36.9***
Transport	
Transport in the Dom. Rep.	24.2
Cooling in the Dom. Rep.	17.4
Refrigerated ship (loading and unloading)	8.0
Refrigerated ship (transport)	312.1
Transport to the ripening facility	66.0
Transport to the fruit importer	20.5
Transport to the wholesaler	39.7
Transport to the retailer	17.1
Total (Transport)	***505.0***
Processing	
Ripening process (ripening chamber)	132.9
Total (processing)	***132.9***
Total	**674.8**

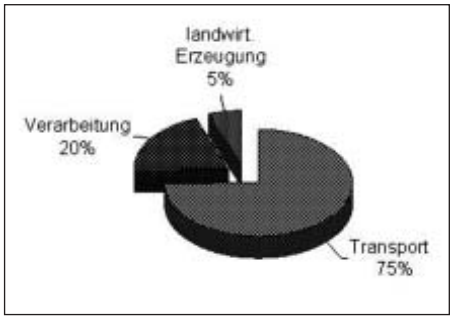

Fig. 1: Percentage of GHG emissions by agricultural production, transport and processing of Dominican bananas from organic farming

effect on the total balance. Suitable approaches to a reduction in emissions in the marketing chain may lie in the optimising logistics (e.g. transport by train, centralising the site of ripening) or in the use of certified eco-power for the ripening process. In order to achieve this, the individual processes must be analysed from the economic perspective, in order to find alternatives, which can be justified from the commercial perspective. One such approach to solving emission questions could be the emission management system developed by the AGRA-TEG GmbH [4]. In this system, the GHG emissions in enterprises are systematically recorded and documented, in order to deduce, on this basis, economically viable measures for reduction. Unavoidable GHG emissions can be balanced within this system by means of carbon credits, in order to offer an emission neutral product.

The cost of balancing all accruing emissions in the production and marketing chain for organic bananas, as considered here, is, depending on the estimated price for carbon credits, around 1 cent per kilogram of bananas. The question is therefore raised, whether the consumer would be prepared to bear the additional cost for an emission-neutral product.

Literature

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