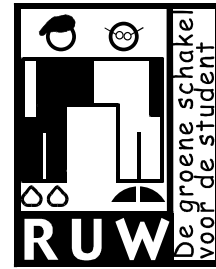


Reed and algae: the greener future of the Netherlands?

By: *Andries Middag*

Thursday 12th of March Stichting RUW (or Rural Wageningen Foundation) organized an excursion to two innovative projects in the Netherlands. The first one was water park Het Lankheet close to Haaksbergen, the second one algae farm AquaPhyto close to Zeewolde In this report a summary of the most important and striking points.



Water park Het Lankheet

The consortium Water park Het Lankheet consists of five parties: estate Het Lankheet, Province Overijssel, Water board Rijn & IJssel, Koninklijke Nederlandsche Heidemaatschappij and Plant Research International. It is financed by the European Union, Living with Water, the Dutch Ministry of Agriculture, Nature and Food Quality and the consortium itself. Unto 2010 fundamental scientific research is done after the purification of surface water by reed filters. In the period 2005-2006 reed fields were gradually constructed in 18 compartments with horizontal flowing. Experiments are done with day/night rhythms, seasonal and continue flooding, harvesting time and wet/dry situations. The reed is harvested to carry the filtered materials away. This makes it a sustainable system, because of not polluting the soil. The harvested reed can be used to produce green energy. The purified water is spread all over the estate by the age-old and fine-meshed flow pasture system hereby contributing to fight dehydration and the development of nature areas because of denitrification of the soil by the clean water.

Energy from reed

'Products' of the water park are bio fuel and fertilizers from reed biomass, water retention, purification of water, an increased groundwater level, embellishment of the public space and nature values. In the presentation of Bastiaan Meerburg (PRI) the focus was on the potential of reed biomass as fuel. Reed has a potential harvest of 30 ton dry weight per hectare per year. With a total amount of around 150,000 hectares 3-5 million tons of reeds can be harvested. This amount is, thermically used, an equivalent of 14-24% of the total expected need for biomass or 2-4% of the total expected need for energy in the Netherlands. The amount of 3-5 million tons of reeds is also enough for 1,100-1,800 million liter bio ethanol, which provides in 6-9% of the energy used of our total fleet of cars in 2010. Practically this means 300,000-500,000 cars, supposing 25,000 km per year and an average use of 1 liter per 15 kilometers. This scaling up of the reed production (from 3 hectares now to 150,000 in the future) is also important when looking to the policy on the decreasing of CO₂ emissions, water retention, water purification and nature development. All together reed production can be seen as a new driver for the countryside.

Discussion

Next to these possible advantages there are also some points of discussion. It is for example in the present situation a fact that the water park can not function economically independent. Of course there are possibilities when governments are paying for management of nature areas and water, but the



exact amount of money this can fork out is not clear yet.

Another big question is on how to make sure that there is reed (for selling) for warming of houses, also after a hailstorm, like there was on the 19th of June in 2008. After this the production of biomass of the reed fields was decreased ten times. Imagine being a nursing home depending on this reed!

Other remaining questions are on the probability of scaling up to 150,000 hectares of reed fields, the reward for different farmers purifying the water, the harvesting of the reed, the resistance of traditional farmers and a lot more. To be continued.

Algae farm AquaPhyto

In the afternoon we visited AquaPhyto, after a long trip from Haaksbergen to Lelystad, where we first had a presentation in a room in a restaurant on the airport of Lelystad. After that we visited the location of the farm itself close to Zeewolde. This location was chosen because, according to the director of AquaPhyto, Robert Baard, it is the center of the Netherlands and because of its large potential for future expansion of the company. Since 2005 AquaPhyto cultivates microalgae under the European climate conditions on a large scale and ecologically balanced. Microalgae are microscopic plants growing in the aquatic environment using sunlight and specific mineral nutrients. Most of those nutrients are already available in for example waste water; some are added, like some kinds of phosphor, which is becoming more and more scarce. At this moment AquaPhyto is working with three types of production: small tubes under controlled circumstances and two small and one bigger open basin, continually agitated by a paddle wheel system to prevent sedimentation and to ensure proper growth and intermittent exposure to sun light (see also the picture below).

Developments

'The products of algae are applicable in several market segments including food and feed, bio fuel, medicinal purposes, personal care products and cosmetics, as well as agro technological and veterinary applications' (www.aquaphyto.com). Microalgae are one of the richest nutrient sources with a high nutritional value, expressed by its composition: protein, essential amino-acids, essential vitamins, carbohydrates, fibers, pigments, minerals, trace-elements and poly-unsaturated fatty acids.

Two specific and new fields of research and development for AquaPhyto are the marine or saline microalgae production and the production of algae for application as bio fuel. A lot of the research is done together with foreign investors and companies, for example the Japanese company Teijin. Because of the preliminary phase of the research carried out not much can be told about these developments. The same goes for a lot of other information, about the harvesting and the exact ingredients of the algae, making it sometimes a bit vague. What became clear is that production of algae on a real large scale is, according to Robert Baard, not possible in the Netherlands, because of the limited amount of space available for a production method like this. Goodbye algae as greener future of the Netherlands...!

Discussion

In the discussion the point of the exchange of information between the different parties involved in microalgae production came up again. The argument of AquaPhyto not to share their knowledge with other parties is that they do not want a *brain drain* to their competitors. On the one hand this seems logical, but



on the other hand is it also a fact that there is a lot of information not clear at this moment, also for experienced researchers that are working at AquaPhyto.

Another question is about how to deal with the phosphor needed: is there an alternative for this ingredient or what will be the consequences of the scarcity for the price of algae and products made of algae?

What also stroke some of the participants is the fact that there is still a lot to be done when it comes to the diversification of the production of algae and the processing of harvested products. On this moment a lot patents are already claimed by other companies, for example those producing fuels or energy. Developments like this make it difficult and complex on which parts of the (production) process to focus and also question the future potential of certain applications of microalgae.

To conclude: a lot of the questions we had before are answered, but a lot of new questions arose. Not anything to worry about, just a sign that there still is a lot to do about reed and algae, also for students and researchers of Wageningen UR! So, maybe, in a few years, we will talk about this music of the future being real!

More information:

www.waterparkhetlankheet.nl

www.aquaphyto.com

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