

WATBIO visits poplar energy plantations in Poland

Collaboration with poplar breeder Franco Alasia reinforced

Summary

- Poplar tree breeding and cultivation expanding in Europe with more than 10,000 ha of planting in Poland over the next few years.
- WATBIO partner, commercial breeder Franco Alasia, is playing a key role by supplying of new clones for this expansion, using traditional crossing and selection.
- There remains significant potential to accelerate this poplar breeding through the use of molecular technologies currently under development in WATBIO.

As part of the WATBIO efforts to support sustainable biomass production, a group of WATBIO partners visited Brusno and the surrounding area of Poland 26-27 October 2015 to see first-hand activities being undertaken by WATBIO partner Franco Alasia (FA). FA is providing the planting material for extensive commercial planting of poplar as energy feedstock for the paper industry. The group consisted of:

-Professor Gail Taylor (University of Southampton) WATBIO coordinator and leader on Forward Genetic approaches in the project (WP4);

-Professor Antoine Harfouche (University of Tuscia) WATBIO leader on Skills and Training;

-Dr Donal Murphy-Bokern, (DMB) WATBIO coordinator for dissemination and long-term impact of the project;

-Mr Franco Alasia (Alasia) WATBIO commercial partner and pre-eminent poplar breeder

We were hosted by Franco Alasia and Greenwood Resources (GWR), represented by Mr Piotr Przytarski who is a professional forester. We were given a tour of the new poplar plantations around Brusno that were planted April-June 2015. These plantations are on land now owned by GWR where they are producing biomass for their client International Paper (IP). IP is one of the largest paper companies globally and the biomass from this new planting will be used to generate heat and power for the paper pulping mill that is located in Poland. The use of biomass for processing heat and power is part of efforts to

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reduce the carbon footprint of IP's operations. The land holding in Brusno purchased in 2015 by GWR has already been planted with approximately 3,000 ha of F₁ poplar hybrid, all supplied by Alasia. The clones are registered in Italy as AF13, AF16, AF18, AF34. The material has been selected from crosses between a number of black poplar (*P. nigra*) parents and *P. trichocarp* and *P. deltoides* gathered by Alasia through collection trips. These new genotypes were developed from traditional crossing and breeding and have been at least ten years in the breeding pipeline of Alasia, following the initiation of a breeding programme in the 1980s.



Photo 1. Left to right. Piotr Przytarski (Greenwood Resources), Gail Taylor, Antoine Harfouche and Franco Alasia in a five month-old plantation of poplar at Brusno in Poland (Photo: DMB).

About 10,000 ha of Alasia poplar has already been planted in Poland. In addition to this, The target for the Brusno area is to plant 10,000 ha of F₁ poplar in the next year or two that is high in vigour and disease resistant. The whole area is a Natura 2000 site and so minimizing chemical inputs and optimising landscape-scale biodiversity is a priority. Mechanical weeding between the rows which are 3 m apart is the standard weed control

practice in year 1. These trees will be harvest after five years and it is estimated that the yield will be at least 15 tonnes ha⁻¹ y⁻¹ dry weight.

The planting resulted in more than 98% establishment, and this achieved on a variety of soils and in a year where there was no rainfall for at least 30 days during the first growth following planting. This success can be partly explained by the use of 'rod' planting rather than shorter cuttings. In rod planting, long 1.7 m one year cuttings, 2-5 cm diameter are cut during the winter prior to planting and kept in cold store. During planting, which was achieved by a bespoke planter designed by AF, the rod is inserted into the ground to a depth of 60 cm. This deep planting has enabled these trees to make good growth during the first year, with more than 4 m of height achieved for many of the trees seen on our tour. In a side-by-side comparison of small 60 cm cuttings and long rods, it was clear that rods are a preferable technique resulting in strong growth.



Photo 2. Six-month old poplar growing on podzol soils formed on glacial deposits in northern Poland, adjacent to traditional mixed forest.

We also visited a site approximately 20 km from Brusno where we saw four year old plantings of AF2, AF6 and AF7. These were less vigorous than the newer genotypes planted in 2015, nevertheless it is predicted that yield will be 6-10 tonnes ha⁻¹ y⁻¹.

Conclusion

This visit provided valuable insight into how WATBIO commercial partner Franco Alasia is deploying new genetic material of poplar for wide-scale planting for bioenergy. Further expansion of this programme is likely. The differences between the newest clones and their relatively recent predecessors show the genetic progress being made. All of the genetic improvement in traits to date has been achieved through traditional crossing with a long time from parent selection and crossing to seed production and the assessment of trees that are mature enough to be assessed for economic and agronomic traits (yield and quality) through to the multiplication of new clones for commercial planting. This breeding pipeline could be significantly accelerated in future using technologies being developed in WATBIO and we must now focus on bringing these two approaches together to ensure sustainable feedstock for the bioeconomy of Europe, where poplar is likely to play a key role.



Photo 3. Landscape of rolling hills in Brusno in northern Poland with a new poplar plantation in the background.