

PUTTING MORE VALUE INTO TREES AND WOOD FIBERS



SWE TREE TECHNOLOGIES  
Innovators in Forest Biotechnology

# Tailor-made feed stocks

## Possibilities and challenges


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February 6<sup>th</sup> 2017 at

Feedstock for sustainable biofuel production

- Feedstock potentials, climate change impact of forestry, realisation of forest biorefinery and more!

*A co-arrangement by f3, SLU and Bio4Energy*



(How) can genetic improvements  
facilitate trees as a base for large  
scale Biofuel production



## Breeding possibilities

- All yield promoting improvements will facilitate an increased use of bio mass
- Tailor-made wood could give wood that are optimal for different Bio refinery applications.



## Trees are attractive as a bioenergy system

- They display a wide range of growth habits
- They can be grown on lands unsuited to agricultural crops including energy grasses
- Trees need reduced input and less optimised land management compared to agricultural crops



# Gene based breeding : The Opportunity



10 000  
Year ago



Domestication

~~Breeding  
revolution~~

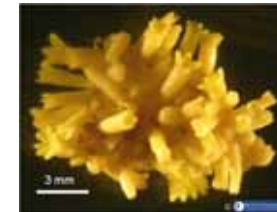
1995

~~Biotechnology  
revolution~~



## Increased yield / yield protection at SweTree Technologies

- Improved forest regeneration using novel fertilizers and seeding systems developed in the company SweTree Nutrition
- Directed breeding
  - Family forestry using Somatic Embryogenesis
  - Genomic Selection coupled to Somatic Embryogenesis
  - Gene based breeding
    - Transgenic forestry
    - Other use such as
      - Marker assisted breeding
      - Directed mutagenesis



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# Tailor made trees: Cell walls a complex structure



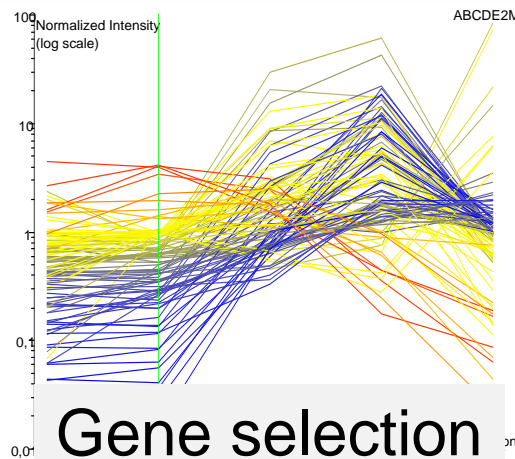
## Wood as dedicated Bio fuel raw material

- Wood is a complex and recalcitrant biomass compared to many agricultural bio mass sources. (1<sup>st</sup> to 2<sup>nd</sup> generation Biofuels)
  - This is possibly not a problem for thermal processes directly on the bio mass.
  - But for all process where the biomass need to be degraded and separated into different components such as into sugar monomers; the complexity and recalcitrance is a problem
- Wood chemistry and structure can be modified so that for example saccharification amenability is greatly enhanced
  - Both cost of degradation and product yield are targets
  - A challenge is to make such modification with bio mass yield retained.





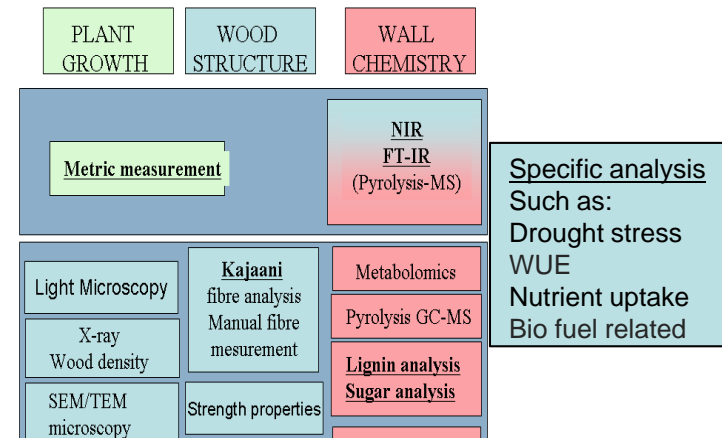
# Efficient Gene testing in Hybrid aspen



Cloning and transformation



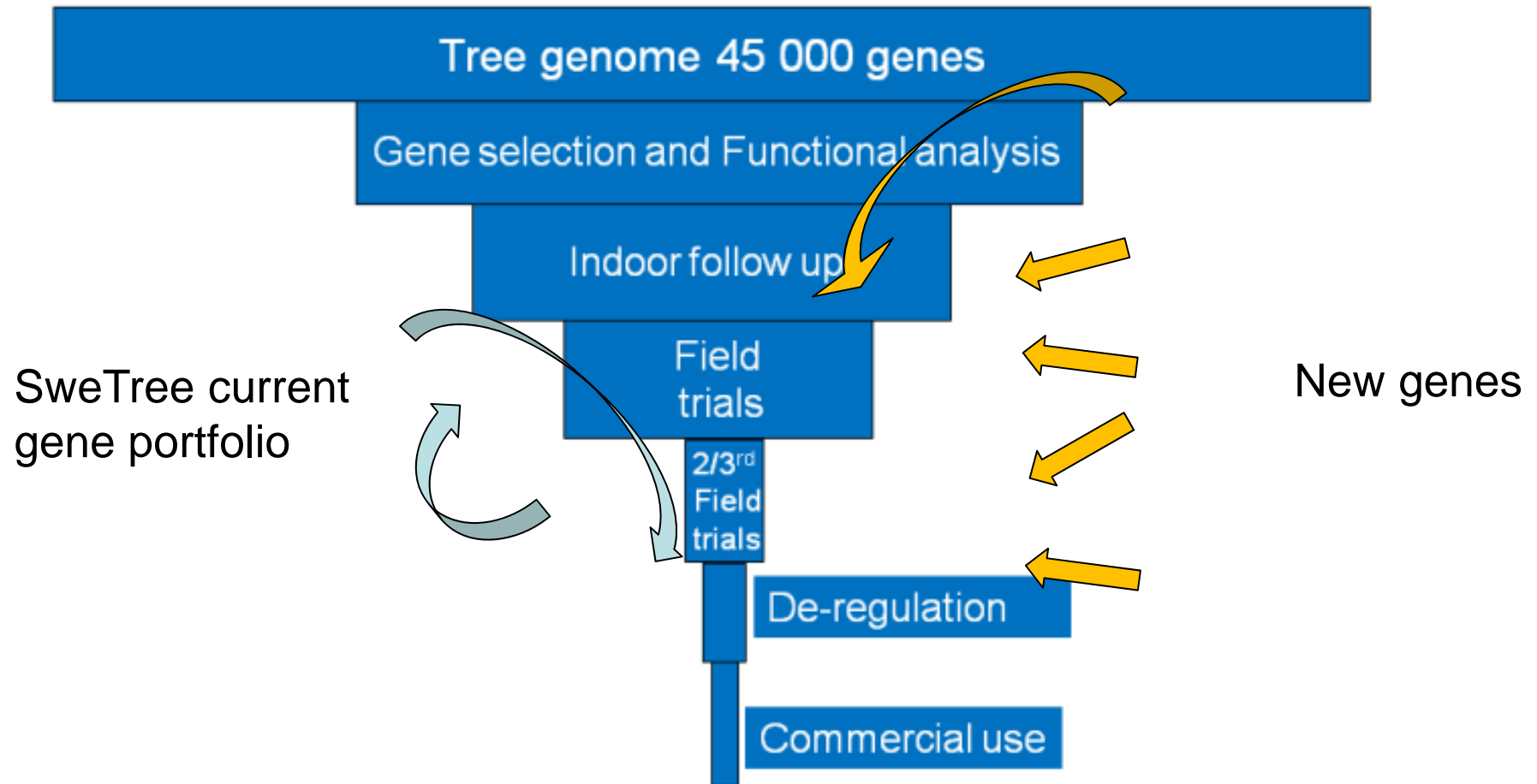
Greenhouse test



Phenotypic analysis



# R & D plan : Breeding based on gene knowledge



SweTree Technologies AB have an scientific innovation base



## Woodheads AB

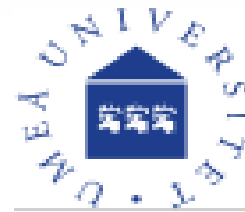
*an holding company owned by a group of senior scientists in Swedish forest biotechnology. SweTree has the rights to all their inventions.*



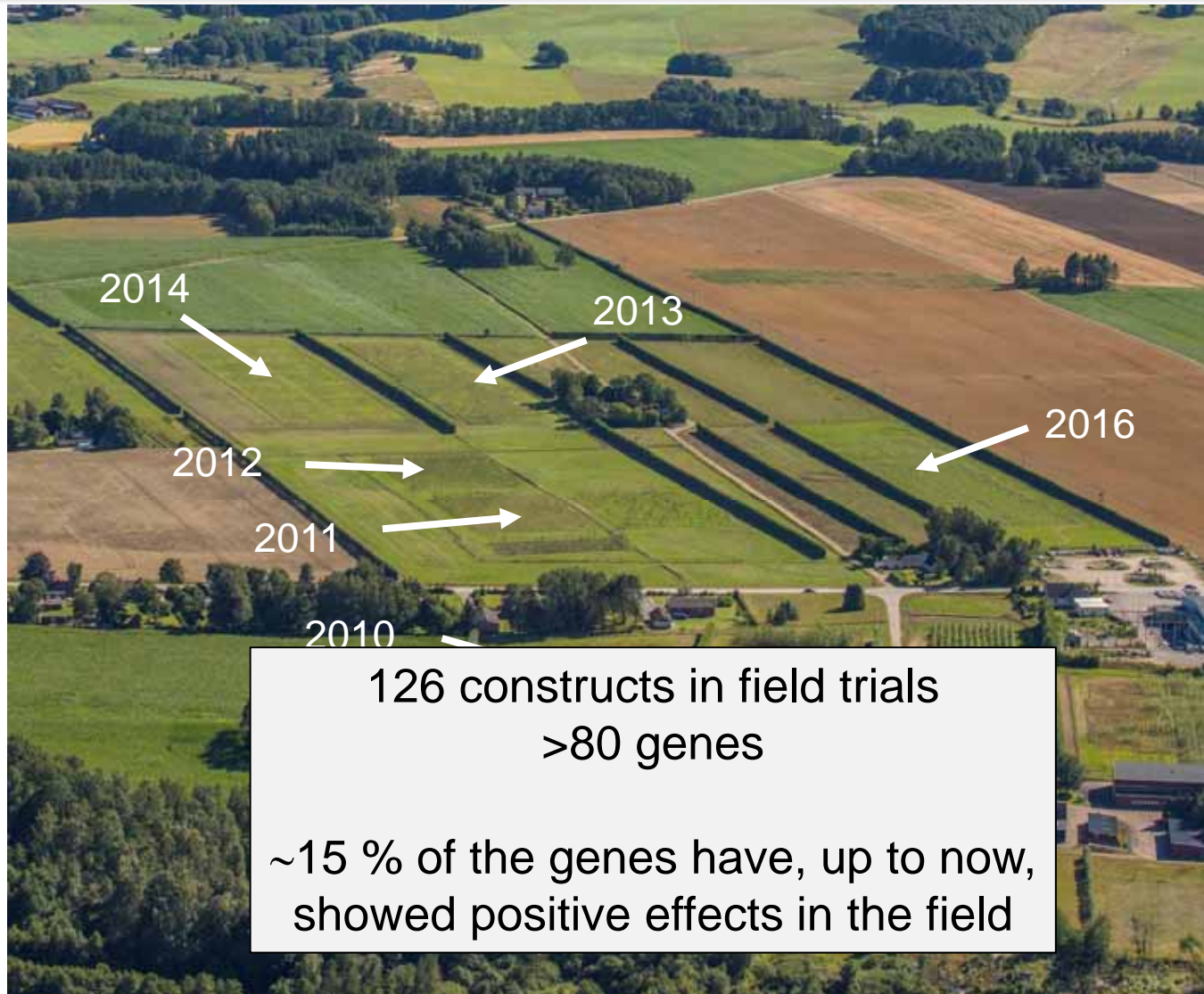
ROYAL INSTITUTE  
OF TECHNOLOGY



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## GM Hybrid aspen field trials, 15 ha



# Industrial challenges

## Biomass – Factory coupling

- If wood is tailored for a certain process and a factory is designed to use a certain type of crop creates challenges on both the biomass and factory side.

## Rotaion time and yield

- High yields and short rotations is important for a possible set up dedicated crop coupled to factory set up
- *Populus* species is a possibility for Tailor-made wood for bio refinery purposes.





Thank you!



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