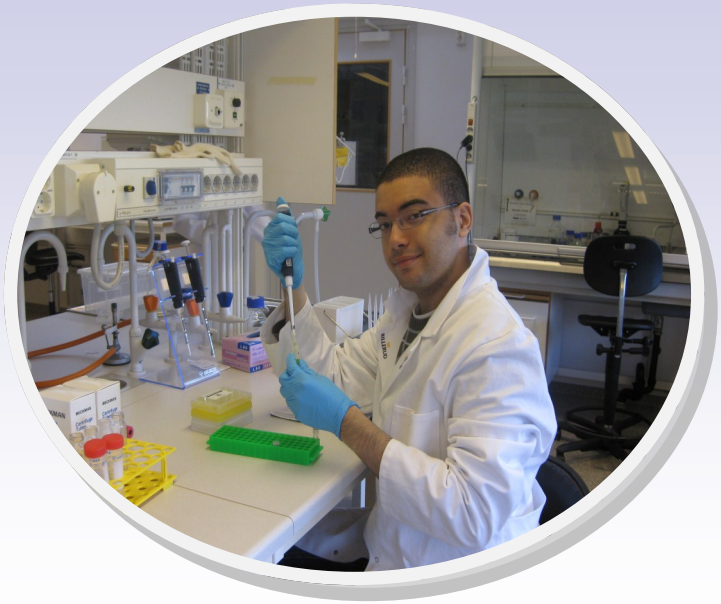
Two pictures of 60 day old plants with the wild-type (left) and HM *tpk5-e* mutant (right)



Potassium channel AtTPK5: An essential or redundant regulator of photosynthesis in Arabidopsis?

Behrad Shiki Baluch
Supervisor: Cornelia Spetea Wiklund
Co-supervisor: Patrik Milton Karlsson

Conclusions

The *tpk5-e* mutant plants that were light-adapted proved to be unaffected in their ETR-activity and O_2-evolution was statistically significantly lower in the *tpk5-e* mutant in comparison with the wild-type during high light exposure. The decreased O_2-evolution in light-adapted *tpk5-e* mutants indicate that the photosystem II (PSII) activity in the chloroplast is affected by the AtTPK5 deficiency.

Acknowledgements
I would like to thank my supervisor's group and Alex Verner's group for their help and support.

Contact Information
Mobile: 0765812819
E-mail: behsh726@student.liu.se

Final thesis 2011
Molecular Genetics & Physiology
International Masters Programme

Background

The plant cell contains a unique organelle known as the chloroplast which is reponsible for conducting photosynthesis. *Arabidopsis thaliana* was used for this project as a plant model to understand the functions of a specific protein known as Tandem Pore Potassium Channel 5 (AtTPK5). As the name implies AtTPK5 is a transport system of potassium ions but the specific location and role of this protein in the plant cell has not been fully explained. AtTPK5 is, however, predicted to be located in the plant cell chloroplast.

Aim

The aim of the present project were the following:

(i) to screen for homozygous (HM) mutants which would have fully lost or partially lost their ability to express AtTPK5.

(ii) to clarify the physiological role of AtTPK5 in *Arabidopsis thaliana* by comparing plant fitness and photosynthesis in both mutant and wild-type.

Hypothesis

The experimental hypothesis for this project was that a knock-out or knock-down of AtTPK5 protein expression will negatively affect photosynthetic activity.

Arabidopsis thaliana

Methods

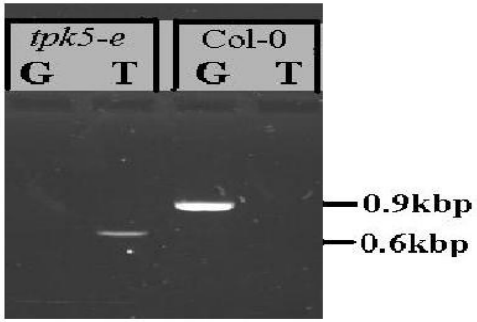
The *Arabidopsis thaliana* plants that were used for the project were all grown in a hydroponic system with 70% humidity and they consisted of two different T-DNA insertion mutants that were a knock-out (*tpk5-e*), a knock-down (*tpk5-UTR*) mutant and a wild-type. All plants belonged to the same ecotype, Columbia-0.

Primers were designed for the screening of HM mutants and the wildtype was used as a positive and negative control.

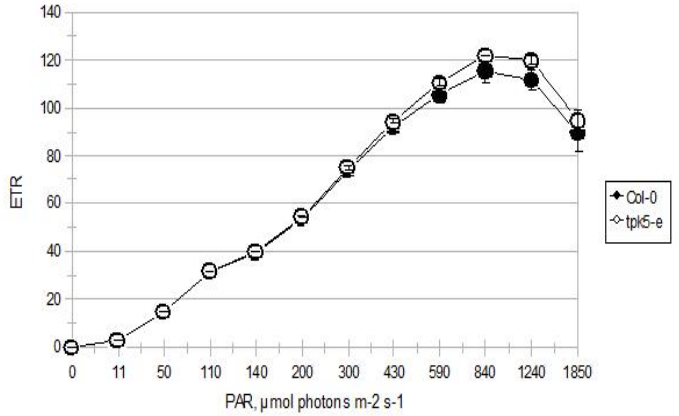
The plant photosynthetic activity was measured in 4 hour light-adapted plants as both chlorophyll fluorescence and oxygen (O_2)-rate and later calculated and presented as electron transport rate (ETR) and O_2-evolution in plants that were 54-56 and 69 days old respectively.

Results

PCR screening results with the tpk5-e mutant and wild-type (Col-0). HM mutants were only found for the *tpk5-e* mutant during screenings.



A comparison of the ETR between the *tpk5-e* mutant and wild-type (Col-0) plants with no statistical significant difference in their mean ETR values.



A comparison of the O_2-evolution between the *tpk5-e* mutant and wild-type (Col-0) plants with a statistical significant difference during high light stress.