Conclusion

Our results proposed that arbuscular mycorrhiza symbiosis increases both the efficiency and the capacity of photosynthetic apparatus in the model legume *M. truncatula.*

The beneficial effects are clearly reflected in the better growth and reproductive fitness of the plants as well as in the better use of phosphorus from the soil.

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Does arbuscular mycorrhiza symbiosis increase the capacity or the efficiency of the photosynthetic apparatus in the model legume *Medicago truncatula*?

Master thesis in Molecular Genetics and Physiology 2010

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Background: The Arbuscular Mycorrhiza (AM) is an endo-symbiont of higher plant roots. This endosymbiosis is based on the mutual exchange of nutrients between plant and fungus. AM symbiosis increases the sink size of the roots, and in response to this, the plant increases its photosynthetic performance.

Hypothesis: Mycorrhization can cause an increase in efficiency of the photosynthetic activity. It can also cause an increase in photosynthetic capacity without changing their specific activity.

Aim: To investigate the pathway used by plants during AM symbiosis to increase photosynthetic performance.

Plant groups: The model organism *Medicago truncatula* were cultivated in the soil with four different treatments.

AM: Mycorrhized

NAM: Non mycorrhized

Fil.: Bacterial filtrate.

Pi (5mM): Watered with 5mM KH_2PO_4

Results: The *M. truncatula* appearance reveals that AM and Pi (5mM) plants looks similar with each other while plant size is greater than NAM and filtrates. The plants appearance also reveals that the AM plant looks more greenish than NAM (fig.1). An apparent fungal structure was seen in AM plant roots and it comprised of intra-radical hyphae, arbuscules and vesicles (Fig. 2).

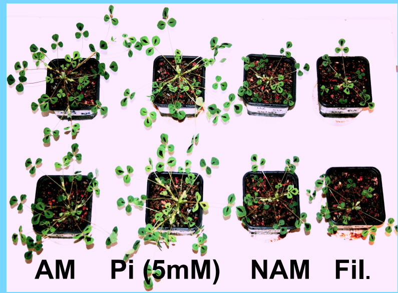

Fig.1: *Appearance of 4 weeks old plants*

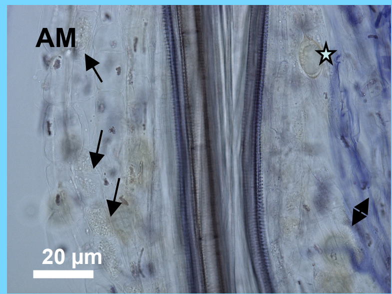

Fig.2: *Fungal colonization* in *Arbuscular mycorrhized plant roots. Arrows indicate arbuscules, double arrow indicates intra-radical hyphae, and the star shows one vesicle.*

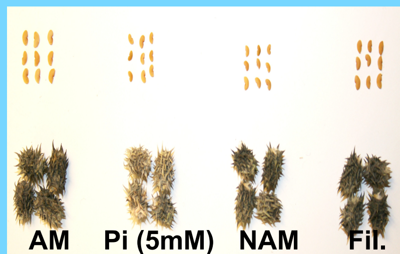

Fig.3: *Reproductive fitness*

The results revealed that AM plants have better seed quality (fig. 3) and showed a significant increase in dry weight (fig.4) as compared to NAM, Fil and Pi(5mM). Better growth and reproductive fitness of the plants are indicating the establishment of symbiosis in *M. truncatula.* Western blot analyses with anti- Lhcb1 antibody has shown that overall Lhcb1 protein is accumulated at about 30 % higher level in AM as compared to NAM, Fil and Pi (5mM) plants (fig. 5). The photosynthetic electron transport rate (ETR) was measured from over night dark adapted plants leaves for 5 min and found that ETR increased in AM plants (an average increase of 5.4 fold) as compared to NAM plants (fig.6).

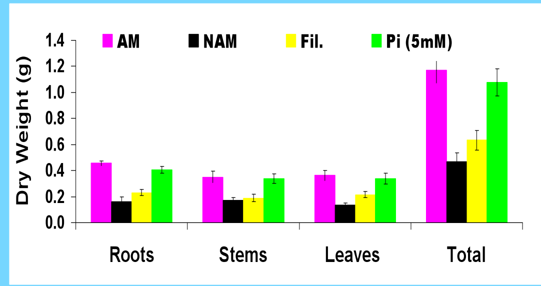

Fig.4: *Plant roots, stems and leaves biomass*

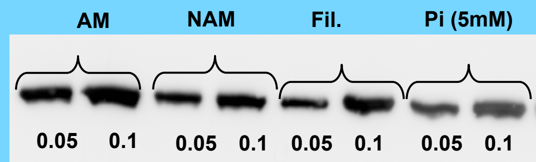

Fig.5: *Level of light harvesting chlorophyll a binding protein, Lhcb1. The amount of chl loaded per lane is indicated.*

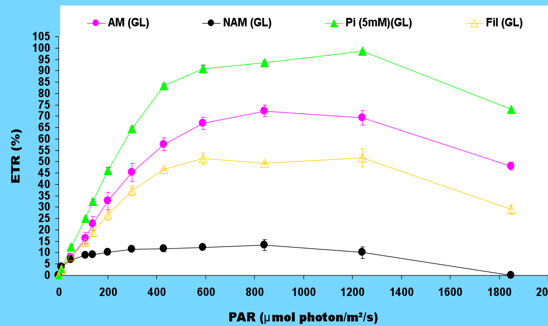

Fig.6: *Light curve of photosynthetic Electron Transport Rate (ETR). PAR, photosynthetically active radiation*