European Network for the durable exploitation of crop protection strategies

IA3 Activity: *Human resource exchange*

***ENDURE* - Internal Mobility**

Final activity report
(The form has to be filled in and sent to the activity leader – message should be sent to his p.a. denise.barreiro@ibaf.cnr.it – within 15 days after the end of the visit)

Topic of the visit
Study of new technics and methods

1. Information about researcher and sending partner

Name and surname: Zita Sasvári

Professional status: PhD student

Sending partner: Szent István University

Institute/Department/Research Unit:
Plant protection Institute, Microbiology and Environmental Toxicology Group

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E-mail and phone number of the researcher: Sasvari.Zita@mkk.szie.hu

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Supervisor e-mail*: Posta.Katalin@mkk.szie.hu

Supervisor phone number*: +0036 28 522910

*Supervisor information only for PhD student, post-doc and junior researchers

2. Information about hosting partner

Hosting partner: IPP-CNR

Institute/Department/Research Unit: c/o Department of Plant Biology university of Turin

Address: Viale Mattioli 25, 10125, Torino, Italy

Supervisor name*: Valeria Bianciotto Ph.D.

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Supervisor phone number*: +39 011 6502927 ext 51

***** For senior scientist indicate the name of the collaborating colleague

3. Information about the visit

Duration: 3 months

Starting date: 12th January 2009

Ending date: 12th April 2009

4. Description of the activities and outcomes

Background and context:

Understanding the effects of different fertilizations upon communities of AMF would help to ensure an opportunity for the utilization of the symbiosis in agrosystems and screening of AMF isolates for stress tolerance and adaptation provide possibilities to find appropriate inoculum in high-input agriculture. The aim of my work was to identify the main AM species involved in root colonization of arable maize plants at different quality and quantity of fertilization. For these reasons maize plants from the long term experiments near Martonvasar were used where different treatments caused changes in the mycorrhiza diversity. These long term experiments were established in 1961 to give more information about the influence of different agricultural practices on the quality and quantity of corn and soil and we started to study it in connection with mycorrhizas only in 2007.

Objective:

Identification of AM fungi within a root system is challenging because of obligate biotroph nature of these fungi. Most of the studies have lied on the spore morphology for identification of AM fungi however the level of spore production does not always reflect the abundance of the mycorrhizal species in roots. Using SSU rRNA gene sequences to understand AMF community structure also has its limitations, as it is known that different nuclei within a single isolate can contain different copies of the SS rRNA gene. All of ecological studies require a breadth of view in may ways for example in field of biology, biotechnology, genetics, statistical analysis, bioinformatics, etc.. Without knowledge in

these fields it is impossible to carry out any kind of assay. Gaps in my knowledge are on field of statistical analyses and bioinformatics and on some laboratory method like RNA isolation. That's why I tried to fill these gaps under the 3 months what I spend in Turin as ENDURE short mobility participant.

Activities carried out:

Under the period I spent in the Department of Plant Biology University of Turin I had a good opportunity to learn the analyses of my sequences data with a different sequence analyzing program like Mega 4.0 and MrBayes 3.1. These programes make me able to alingment my sequences and build phylogenetic tree. I learned to use Chimera Detection program, which is a part of the SimRank 2.7 package and it help me to detect chimera sequences. For statistical analysis I got acquainted with DOTUR, which is a computer program that takes a distance matrix describing the genetic distance between DNA sequence data and assigns sequences to operational taxonomic units (OTUs) using either the furthest, average, or nearest neighbor algorithms for all possible distances that can be described using the distance matrix. Between 2nd February 2009 -6th February 2009 I took part some seminar lessons: Mariangela Girlanda: Genetic diversity of fungi; Cristina Prandi: Carbon and the molecular diverity of life; Cristina Varese: Fungal identification by means of morfological and physiological features; Lodovica Gullino: Basic concepts and definitions in plant pathology; Paola Bonfante: Plant/fungal/bacterial interactions. In the laboratory I latch on to working on diversity of AM fungi in a different land use soils based on molecular technology. Amplification both of partial SSU and LSU rRNA gene sequences by PCR were performed with NS31/AMmix and LR1-NDL22 and 28G1/28G2 nested oligonucleotide primers respectively. We purified the ~550 bp and ~600 bp amplified products, inserted into pGEM®-T vector and transformed into *E. coli* bacteria. After screening we sent the colonies (288 samples) contain the right size insert to sequencing. In line with this work we made some experiment with Experion ™ Automated Electrophoresis System (Bio-Rad) to build a restriction pattern library. At first step we amplified the cytochrome-c-oxydase subunit-I mitochondrial gene sequence from different AMF strains by PCR with Gm COXF3/Gm COXR2 primers and digested the amplified products with the restriction enzyme MspI and separated with the Experion DNA 1 K analysis kit (Bio-Rad).

5. Links between visit activity and ENDURE

Vesicular-arbuscular (VA) mycorrhizal fungi, which form symbiotic associations with root systems of most agricultural, horticultural and hardwood crop species, are widespread potential biocontrol agents. Although the primary role of VA fungi is to improve the mineral nutrition of host plants, their presence also renders root systems resistant/tolerant to attack by soil-borne pathogens and mycorrhiza could be a way in the future to reduce the quantity of pesticides use.

My work is connected to the activity of RA2.2 – Exploitation of innovative technologies for implementing crop protection strategies. On one hand mycorrhiza could be an indicator for the healthy soil which could be useful for soil tests. On the other hand using mycorrhiza as inoculums the reduction of pathogenic fungi (*Fusarium, Phytium, Verticillium*...) is possible without any fungicides however it is requiered more research. That is the reason why so important to study the effect of different agricultural practices (fertilizers, pesticides...) on the diversity of mycorrhizal fungi. It is likely that in the future most systems of agricultural crop production will be less intensive with significantly reduced chemical inputs, not only of fertilizers but also of pesticides.

6. Impact

Added value for the researcher:

This occasion allowed me to really improve knowledge. Also, this mobility allowed me to develop a good relationship with our host partner and thanks to my stay at them.

Added value for sending partner and hosting partner:

This mobility was a very good training for a recently recruited junior scientist and it allowed to rapidly immerge the scientist in the ENDURE network in order to facilitate her activities in the future. Thanks for the possibility to the ENDURE and to the Department of Plant Biology university of Turin

Date of submission: 16th April 2009

endure
diversifying crop protection

Dr. Maurizio Sattin
IA3 activity leader

Approved