



H.F.R.I.
Hellenic Foundation for
Research & Innovation

Description of the funded research project
1st Call for H.F.R.I. Research Projects to Support Faculty
Members & Researchers and Procure High-Value
Research Equipment

Title of the research project: Study of the etiology, epidemiology and ecology of pepper yellows disease (PYD)

Principal Investigator: Varvara Maliogka

Reader-friendly title: Steep

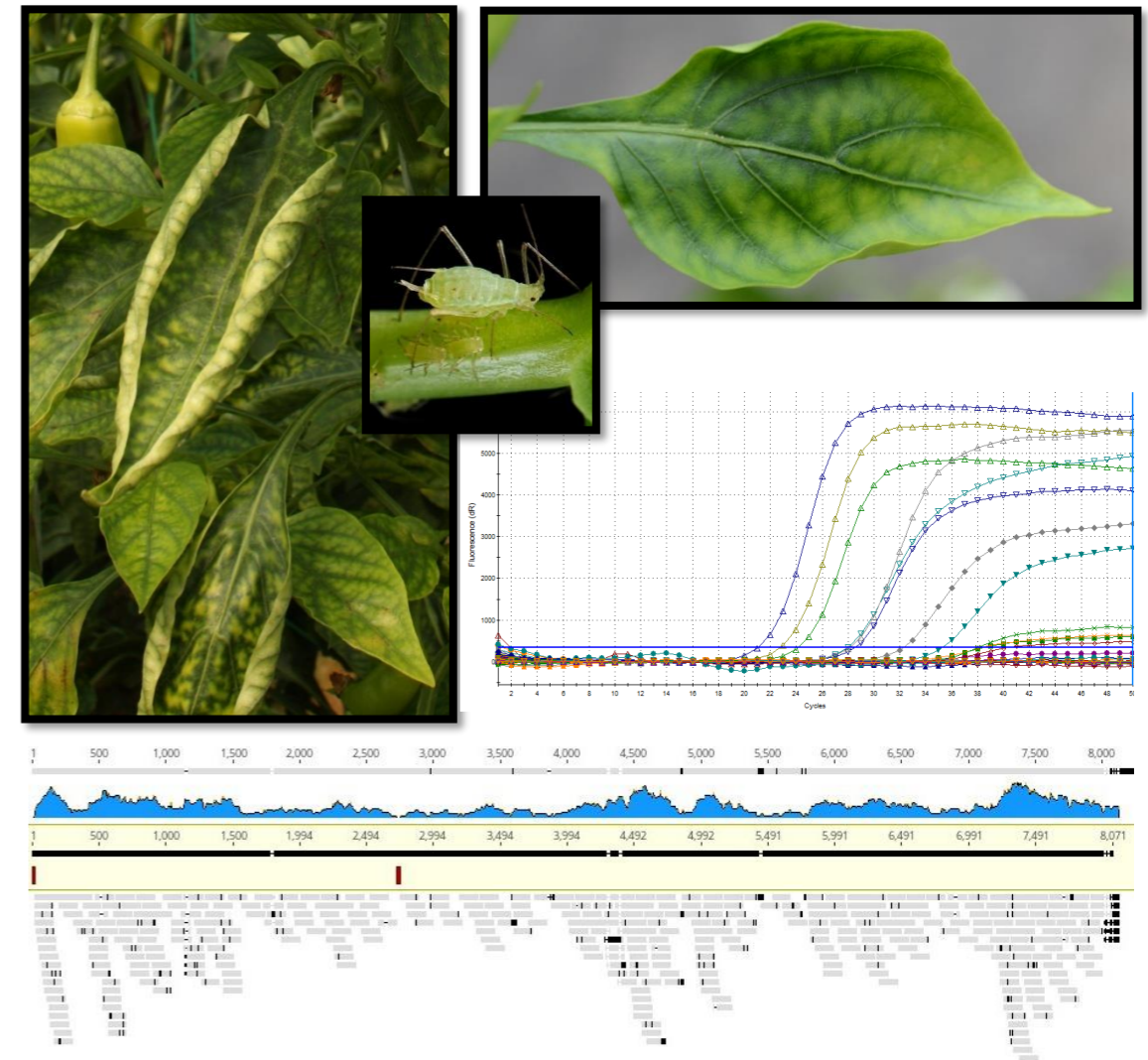
**Scientific Area: Agricultural Sciences-
Food Science & Technology**

**Institution and Country: Aristotle
University of Thessaloniki, Greece**

**Host Institution: Aristotle University of
Thessaloniki**

Collaborating Institution(s):-

**Project webpage
(if applicable):-**



Budget: 180.000 €

Duration: 36 months



Research Project Synopsis

Pepper yellows disease (PYD) is an emerging infectious disease caused by viral pathogens, which can severely reduce yield. Pepper plants affected by PYD have a very characteristic symptomatology, which includes stunting, interveinal yellowing, upward leaf-rolling and fruit discoloration and malformation. So far, a group of closely related poleroviral species were associated with PYD worldwide. However, due to their recent emergence they have not been thoroughly studied. In Greece, until 2012 the disease appeared sporadically. After its first epidemic in 2013 PYD became endemic in Crete causing significant damage. Given the impact of the disease on pepper production, the scope of this study is to obtain epidemiological, biological and molecular data that are necessary in order to establish an effective control strategy. Focus will be given in the clarification of all the infectious agents of PYD and their interactions with the PYD-associated polerovirus in Greece, PeYV. Epidemiology and molecular ecology studies will provide data on the extent of the problem and on the spatial and temporal fluctuation of the associated pathogens. Moreover, the molecular characteristics of the pathogens associated with PYD will be studied, pepper cultivars will be categorized according to their susceptibility and means of controlling PYD by activating the plant defense mechanism will be assessed. In addition, cost-efficient and sensitive detection assays will be developed for the quick and accurate detection of PYD in planting material. The experimental work of the project will be performed using state-of-the-art techniques such as next-generation sequencing and reverse genetics as well as classical virological techniques, which is a necessary combination for a thorough study of PYD. Analysis and combination of the data collected throughout this study will provide the means in order to set the foundation for an effective and environmentally friendly control strategy of PYD.

Project originality

Studies on PYD are limited and most of them dealt with the characterization or genetic variability analysis of the polerovirus(es) present in the diseased plants. So, essential biological and epidemiological data of the characterized viruses are still missing. This is why, given the limited data available on the disease itself, the scope of this study is to fully characterize viruses and/or viroids associated with PYD, both biologically and molecularly, and study their interaction with the host plant and the insect vectors. Overall the scientific approach of Steep is based on the use of classical virological methods supplemented by the most advanced technologies in virus detection and reverse genetics with the use of infectious viral clones. By using these tools, we will be able to establish a thorough understanding of PYD. This is necessary because apart from the fact that there is still no available therapy for viral infections, the limited knowledge we have on the disease makes prevention, the only means of control, rather difficult to achieve.

Expected results & Research Project Impact

The outcome of this study will be, apart from the scientific knowledge acquired on the development and spread of PYD, an initial approach on the control of a new emerging disease of pepper. Also, the approach adopted in this project could be used to investigate the etiology and control of other viral diseases of vegetable crops. Pepper is an economically important crop in Greece and other Mediterranean countries. The past few years a high percentage of the total Greek production is exported to other EU countries resulting to an increase of the farmers' income. Although PYD was only recently reported in greenhouse pepper crops in Crete it has been already considered as an important disease reducing both the quality and the quantity of pepper production. As a result, the dynamic of the exporting market has been affected substantially, with serious consequences to the social life of one of the most important pepper producing areas. Steep will clarify the etiology, epidemiology and ecology of PYD, it will provide novel diagnostic tools that shall be useful to nurseries for testing pepper planting material and hopefully will facilitate its control by using environmentally friendly approaches. This will eventually enhance the pepper production increasing its competitiveness to the foreign markets.

The importance of this funding

I feel especially honored and encouraged with the selection of my research proposal for funding from HFRI since I believe that this is indirectly a reward for my overall research activity. In addition, it highlights the scientific value of the current study and its significance for the Agricultural economy of our country. It is especially important that HFRI is supporting the initiatives of young academic members fostering new ideas and innovation and contributing in this way in the maintenance of a high research level in our country. This funding is giving me confidence and allows me to face my research future with optimism.



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