8th SYMPOSIUM OF THE EUROPEAN ASSOCIATION OF ACAROLOGISTS

Universitat Politècnica de València

July, 11th –15th 2016

The rate and extend of invasions is expected to grow as a consequence of global change effects in biological communities. While temperature is often considered as the main driver, other commonly recognized elements of global change are drought and land use change, which may facilitate drastic species range shifts and affect consumer-resource dynamics. Bioinvasions and global change must be then seen as interconnected challenges that pose a growing threat to ecosystem services, such as biodiversity and food security. Mites are particularly notorious invasive organisms both in terms of numbers of species, as well as for their ecological and economic impacts, and the number of destructive alien Acari species is increasing steadily. We outline here new tools and approaches (e.g. genetic markers, modeling) that contribute to understanding the main mechanisms by which species invade new habitats and also provide important insights into invasion risk. We emphasize the importance of scientific risk assessment and policy for the management of invasions under global change.

Neotropical phytophagous mites in Europe – current and potential invasions

Denise NAVIA[1], Francisco FERRAGUT[2]

1) Embrapa Recursos Genéticos e Biotecnologia, Cx. Postal 02372, 70.770-900, Brasilia, DF, Brazil. 2) Instituto Agroforestal Mediterráneo, Universitat Politécnica de València, Camino de Vera s/n, Valencia, Spain. Email: denise.navia@embrapa.br

Invasive pests are among major impediments for agricultural productivity and can seriously affect biodiversity. Phytophagous mites are prone to become invasive pests due to their common cryptic habits and adaptability to new host plants and environments. However, whether a newly introduced species becomes invasive or not mostly depends on the biological and physical characteristics of the environment where it was introduced, which are greatly influenced by climate. Although similarity between Western Palaearctic and Neotropical climates is limited, some species of phytophagous mite species probably native from the Neotropics have become invasive in Europe. These species currently present limited or wide distribution, affecting crops both under unprotected or greenhouse conditions. Some examples are the Texas citrus mite, *Eutetranychus banksi* (McGregor) and the tomato russet mite, *Aculops lycopersici* (Tryon), to whose management still being challenging. Climate change is expected to potentiate the number as well as distribution of invasive species by allowing: the success establishment of new invasive species in localities where climate conditions were unfavourable but became suitable; the enlargement of the altitudinal or latitudinal distribution range of invasive pests. In this context invasive mites originated from or established in the Neotropical region that could affect European agricultural systems will be pointed out. Pest risk analysis should consider both current and future climate change scenarios as well as associated agricultural landscape changes.

Detection and identification of invasive mites and regulatory measures: a global overview

Ronald OCHOA[1], Cal WELBOURN[2], Jurgen OTTO[3], Denise NAVIA[4], Maria NAVAJAS[5], Francisco FERRAGUT[6], Gary R. BAUCHAN[7]

1) USDA, ARS, Systematic Entomology Lab, BARC-West, 10300 Baltimore Ave, Beltsville, MD, 20705, USA 2) Division of Plant Industry, Florida Dept. Agriculture & Consumer Services, Gainesville, FL, 32614, USA 3) Department of Agriculture and Water Resources, Operational Science Services, 1 Crewe Place, Rosebery NSW 2075, Australia 4) Embrapa Recursos Genéticos e Biotecnologia, Cx. Postal 02372, 70.770-900, Brasilia, DF, Brazil 5) Institut National de la Recherche Agronomique (INRA, Centre de Biologie et Gestion des Populations, 755 avenue du campus Agropolis, 34988 Montferrier sur Lez, cedex, France 6) Instituto Agroforestal Mediterráneo. Universitat Politècnica de València. Camino de Vera s/n. 46022 Valencia, Spain 7) USDA, ARS, Electron & Confocal Microscopy Unit, 10300 Baltimore Ave, Beltsville, MD, 20705, USA. Email: ron.ochoa@ars.usda.gov

Plant feeding mites are usually microscopic and camouflaged, making them difficult to detect at ports of entry worldwide. Increased international trade in agricultural commodities and world climate change has resulted in increased interceptions of potentially invasive mite species. The most commonly intercepted economically important plant feeding mites are Tetranychidae and Eriophyidae, but species in the Tenuipalpidae, Tarsonemidae,

Tuckerellidae, Penthaleidae and stored products Acaridae (i.e. bulb mites, mold mites, cheese mites) have been increasing. In addition, other mite families (i.e. Tydeidae, Iolinidae, Phytoseiidae, Winterschmidtiidae, etc.) associated with plants but usually not considered plant pests are being intercepted in increasing numbers. These mite families include many important economic pests or potential pests of crops, fruit trees, stored products, forests, ornamentals, cattle and humans. Trade from regions of the world where there is little or no information on the local mite fauna make it difficult to identify potential invasive species. The primary instrument used to identify regulatory mite pests is the light microscope, but preparation techniques and quality of the microscopes used and images obtained may lead to misidentifications. The use of phase contrast and DIC microscopes can help avoid some of these problems. In addition, user friendly scanning electron microscopes (SEM) (i.e. variable pressure table top SEM and low temperature-SEM) are helping to identify new mites and understand their potential as invasive or adventive species. We will be presenting the value of these technologies together with data on mite interceptions.

Effect of drought stressed plants on spider mites and impact on outbreaks

Miguel G. XIMÉNEZ-EMBÚN[1], Alain MIGEON[2], Philippe AUGER[2], Felix ORTEGO[1], Maria NAVAJAS[2], Pedro CASTAÑERA[1]

1) Department of Environmental Biology, Centro de Investigaciones Biológicas, CSIC, Madrid, Spain 2) Institut National de la Recherche Agronomique (INRA) Centre de Biologie et Gestion des Populations, Montferrier-sur-Lez, France. Email: mgxe@cib.csic.es - migeon@supagro.inra.fr

Climate change (CC) is expected to bring water shortage for irrigated crops in semi-arid environments. Lower irrigation scheduling may greatly contribute to save water in summer crops, but it will also promote drought stress, which will have an effect on plant-herbivore interactions. Changes in both plant nutritional compounds and defenses are common in response to water stress in plants. The performance of phytophagous arthropods on drought-stressed plants will then depend on the balance of induced nutrients and chemical defenses in the plant, and how herbivores adapt to these changes. Here, we explored, under laboratory conditions, the effect of water-stressed tomato plants on the development of the two-spotted spider mite *Tetranychus urticae*. Our data reveal that drought stressed tomato plants induced significant changes on the nutritional quality (increase on aminoacids and free sugars) of the tomato plants. These changes trigger on key biological traits of tomato-adapted and non-adapted *T. urticae* strains that appear to be beneficial to mite performance. However, tomato plant defense proteins (protease inhibitors and peroxidases) were also induced by both drought and mite infestation, being the response generally higher to the non-adapted strain. How much these contrasting results can be explained by plasticity of mites in response to drought-stressed plants was further explored by studying field populations of *T. urticae* originating from a wide geographic range in the EU and experimentally challenging mites in the laboratory to simulate CC conditions. The resulting increased plant damage and outbreaks expected to rise under climate change conditions are discussed.

Forensic Acarology

Seasonal abundance of mite markers of decomposition stages

Naila A. CHE KAMARUZAMAN, M. Alejandra PEROTTI

School of Biological Sciences, University of Reading, Reading RG6 6AS, UK. Email: m.a.perotti@reading.ac.uk

Outdoor decomposition of exposed corpses and carcasses is dominated by scavengers; predominantly arthropods such as insects and mites. These arthropods arrive in waves that correspond to different stages of decomposition, and a time frame related to these stages and particular species can be drawn. However, the process of decomposition differs substantially between seasons, as their colonisers do. While insect markers have been fully studied for most parts of Europe, little exploration of the mites associated with decay underneath corpses has taken place. Determining the mite fauna associated with carcasses at different stages of decay directly impact of case-work in forensic analysis. Mites can inform of time of death, movement of bodies and circumstances of death. Therefore, it is critical to study the variations of the mite fauna along the decomposition process at different