J Plant Physiol Pathol 2016, 4:4(Suppl)
http://dx.doi.org/10.4172/2329-955X.C1.006

Rotylenchulus reniformis, a plant-parasitic nematode of national and international concern

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Plant parasitic nematodes (PPN) are integral and diverse components of agricultural ecosystems. Approximately 4,000 species in 125 genera are worldwide in distribution and account for annual losses of 115 billion US dollars (FAO, 2014). Globally, PPN species in the genera *Meloidogyne, Heterodera/Globodera* and *Rotylenchulus* are the most damaging. Fortunately, except in the case of reniform nematode (*Rotylenchulus reniformis*, Rr), the availability of resistant crop cultivars provides producers with a management tool to help protect against endemic populations. Despite 15 years of research, breeders and nematologists have had minimal success in identifying sources of germplasm effective against Rr. There are a few commercial cultivars of soybean with tolerance to this nematode and no cotton cultivars with either tolerance or resistance. The most severe yield losses to reniform nematode are observed in the states of Louisiana, Arkansas, Georgia, Mississippi, Texas, and Tennessee. Depending upon the level of infestation, cultivars grown, and environmental conditions, yield losses caused by this nematode be as high as 40%. In 2010 and 2011, research with this nematode conducted in the McGawley lab of the Agricultural center of Louisiana State University demonstrated for the first time that there are definable virulence phenotypes among populations of Rr within the state of Louisiana as well as across the southern United States (Nematropica 40:275-288 and 41:12-22). Current research is directed at the development of an abbreviated host differential assay using soilless plant growth pouches and molecular techniques such as single nucleotide polymorphism (SNP's) and DNA sequence analysis to differentiate among endemic populations of Rr.

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The evolution and medical use of nature-based biochemical in angiosperms of the *Asteraceae* of the Americas

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The first Asian-like immigrants to the Americas 20,000 years ago must have been very delighted to discover that many flowers of plants, endemic to the New World, were indeed also similar in their curative powers, to plants they knew quite well in the Old World. In this presentation, I will discuss the physiological and biological activities of unique secondary metabolites in members of the sunflower family (*Asteraceae*). Chemical ecology and medical ethnopharmcognosy studies in my laboratory have provided new insights on the diversity of natural chemicals in various tribes of the *Asteraceae*. Ongoing studies at Cornell with Medical College investigators has revealed that certain categories of metabolites of the *Asteraceae* also exhibit potent activity against leukemia (liquid tumors) and breast cancer (solid tumors). The major take home message of our studies is the following: Natural chemical defenses that have evolved in plants and repel or poison herbivores such as, giant caterpillars, large mammals and fungi also inhibit similar enzymes or proteins in cancer cells and membranes of bacteria and fungi. Of course, some of the metabolites also exhibit the Dr. Jekyll and Mr. Hyde condition of "split biological and physiological activities." I will present examples of two classes of compounds from sunflowers that produce a diverse group of metabolites that as a collective group repel insects and also inhibit cancer cells.

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