Characterizing Pistachio Rootstocks for Host Status to Plant-Parasitic Nematodes

Andreas Westphal, Assistant CE Specialist, Assistant Nematologist, UC Davis/Kearney

INTRODUCTION

Pistachio (*Pistacia* spp.) is a major crop in the US. In California, growers often use the female cultivar, Kerman and the pollinating male, Peters. In the beginning of the pistachio industry in California, theses scions were grafted onto rootstocks of *Pistacia atlantica* and *P. terebinthus.* These rootstocks, susceptible to Verticillium wilt, appeared resistant to *Meloidogyne* spp. and *Pratylenchus vulnus* (root lesion nematode, RLN; Michailides and Teviotdale, 2014; Crane and Maranto 1988; McKenry and Kretsch, 1984). UCB 1, a hybrid of *P. atlantica* x *P. integerrima,* was developed to combat increasing challenges with Verticillium. Overall, nematode problems in pistachio are considered minimal because, in a California survey, only low population densities of plant-parasitic nematodes were found (McKenry and Kretsch, 1984). Susceptibility to *Meloidogyne* spp. (root-knot nematode, RKN) is generally reported as low (Westerdahl, 2015). *Xiphinema index* was found to infect *Pistacia vera* and *P. mutica* (Weiner and Raski, 1966).

Culver and coworkers (1989) chose *P. atlantica* as a resistant standard when screening woody perennials. In preliminary screens of UCB1 clones, large differences between defined clones of this cross have been identified (McKenry, unpublished). In recent work, interaction of RLN with *Mesocriconema xenoplax* (ring nematode), on pistachio, illustrated the susceptible host status of one clone of UCB1 (Westphal et al., 2016). Previous crops were probably planted to nematode-free soils, but today's plantings often follow cotton or vineyards, both of which frequently leave noticeable populations of plant-parasitic nematodes behind. Similarly, nut crops are often infected with root lesion nematode, *Pratylenchus vulnus*.

It is the aim of this project to examine the relative host suitability to *Pratylenchus vulnus*, *Meloidogyne incognita* and *Mesocriconema xenoplax* of currently available pistachio rootstocks, including multiple clones of UCB1 that are marketed by various nurseries.

RESULTS

Two experiments were initiated in 2017. One field experiment had been established to investigate plant responses to root-lesion nematode (RLN, *Pratylenchus vulnus*) and root-knot nematode (RKN, *Meloidogyne incognita*), in sandy loam soil at a location with previous history of walnut cultivation. This experiment contained nine different commercial UCB1 clones, one seedling UCB1, two *Pistacia atlantica*, one *P. terebinthus*, one *P. integerrima*, and one *P. atlantica* × *P. integerrima* cross. In addition, four Prunus rootstocks with known nematode responses and one walnut were included as checks in this test. The plants were available at varying sizes at the time of planting; only newly from-seed-started genotypes were smaller, all other plants established well. On May 17, plants were planted in two-plant plots in a randomized complete block design with four replications. On July 10, each plant was inoculated with 1,012 vermiform RLN and 12 infective stages of RKN using infested soil. On November 7, plant height and diameter were measured, soil samples, 0-18 inches deep, were collected from the root zones of the plants and extracted for nematode detection. Different nematode species were found. In examining RLN, there were minor trends among the genotypes, but overall numbers were much lower than under walnut, and somewhat lower than in the susceptible Prunus.

The second experiment was planted on August 11 in tanks (11)12 × 8 ft area and ca. 4 ft deep filled with sand. Vertical plastic divisions were installed 18 inches deep to allow every plant a growth area of 2.5 × 2.5 ft. Each of these tanks was planted to fifteen plants in randomized complete block design. Each of the five tanks was one replication. On September 1, every plant was inoculated with 1,500 ring nematodes. Here, eight clonal UCB1, one seed UCB1, one *P. atlantica*, three prunus checks, one *P. integerrima*, and one *P. atlantica* × *P. integerrima* cross were planted. The plants established vigorously despite the challenging growing conditions in the sand. A data collection has not been scheduled yet.

CONCLUSION AND APPLICATIONS

Two field experiments for evaluating responses of various plant-parasitic nematodes, on UCB1 clones and controls of previously used rootstock genetics, have been established. Plants grow appropriately vigorously but limited nematode numbers have been detected in the root zones of these pistachio plants. The observation of few nematodes present, in the root zones or roots of nut crop rootstocks, is common, and a much better assessment is expected at completion of the second vegetation period.