Proc. Fla. State Hort. Soc. 133:138. 2020.

—Scientific Note—

Understanding Lettuce Downy Mildew: Pathogen Distribution and Available Host Resistance In Florida

Lis Natali R. Porto, Richard N. Raid, and Germán V. Sandoya*

Everglades Research and Education Center, University of Florida/IFAS, 3200 Palm Beach Rd., Belle Glade, FL 33430

Additional index words. fungicide, pathogen races

Florida ranks third in the US for lettuce (*Lactuca sativa* L.) production, with most concentrated on the Everglades Agricultural Area's (EAA) rich "muck" soils. Lettuce Downy Mildew (LDM), caused by *Bremia lactucae*, is the most important lettuce disease worldwide, causing significant direct and indirect yield losses. It is worse with high humidity (> 95%) and temperatures ranging from 40 to 60° F. Fungicide use and resistant cultivars are the most common methods of LDM management (Santos et al., 2018). However, to preserve the stability and efficacy of these control methods, it is essential to understand pathogen races. *Bremia lactucae* is genetically diverse, with 10 races described in the western US and 15 in the European Union. Information regarding pathogenic *B. lactucae* races in Florida remains unknown (van Treuren et al., 2013; Spring et al., 2018). Thus, the first objective of the present work was to identify the races of *B. lactucae* currently present in Florida. The second objective to screen adapted lettuce cultivars and breeding lines for LDM.

For the first objective, diseased samples were collected from several lettuce fields in the EAA. Additionally, a standard set of 17 differential cultivars: 'Green Towers', 'Dandie', R4T57D, UCDM14, 'NunDM15', CGDM16, 'Colorado', FrRsal-1, 'Argelès', 'Muraires', 'Silvinas', 'Bedford', 'Balesta', 'Bartoli', 'Design', 'Kibrille', and 'Bataille' (IBEB, 2020) were planted in two field experiments to collect and characterize races of *B. lactucae*. Diseased samples from random fields and from the differential experiments were used to inoculate 7-day-old seedlings of the universal susceptible cultivar 'Green Tower' grown in Magenta Boxes® and kept in a growth chamber with 12 h light/12 h dark photoperiod at 60 °F. To elucidate races of *B. lactucae* present in Florida, lettuce differentials were evaluated using a subjective rating scale from 0 (no symptoms) to 5 (> 75% symptoms). Ratings were performed 51 and 65 days after planting, in experiments 1 and 2, respectively. A second objective was to evaluate 10 commercial cultivars and 70 University of Florida/IFAS (UF/IFAS) lettuce breeding lines for LDM resistance under natural field conditions.

For objective 1, only 2 isolates were recovered from 200 inoculations during the 2019–20 season. Prophylactic fungicide applications for LDM are very common in lettuce and it is likely that samples collected from grower fields were treated with fungicides before they reached the lab. However, disease severity evaluated on the 17 differentials cultivars indicated that R4T57D, NunDM15, 'Argeles', 'Muraires', 'Silvinas', 'Balesta', and 'Bartoli' showed a resistant reaction to the pathogen. The remaining differentials had varying levels of disease severity with 'Green Towers' consistently highly diseased. These data indicate the presence of a mixture of races 7, 8, and 9 in the field.

In objective 2, commercial lettuce cultivars exhibited high disease severity indicating that all commercial cultivars planted in the EAA are susceptible to LDM. Most UF/IFAS breeding lines were more susceptible than commercial cultivars; however, a few breeding lines had good resistance to field isolates of *B. lactucae* and these may be useful as parents to improve resistance in lettuce against LDM. Additional studies are needed to fully determine the complexity of races of LDM present in Florida, as the pathogen continues to adapt, evolving into newer races. Once a race structure is identified, a detailed screening of the UF/IFAS lettuce germplasm should be conducted.

Literature Cited

International Bremia Evaluation Board (IBEB). 2020. *Bremia lactucae*. <https://www.worldseed.org/our-work/plant-health/other-initiatives/ibeb/>.

Santos, B.M., P.J. Dittmar, R.N. Raid, and S.E. Webb. 2012. Lettuce, Endive, and Escarole Production in Florida. EDIS Horticultural Sciences Department, UF/IFAS Extension (HS710 series).<https://ufdcimages.uflib.ufl.edu/IR/00/00/34/79/00001/CV12600.pdf>.

Spring, O., J. Gomez-Zeledon, D. Hadziabdic, R.N. Trigiano, M. Thines, and A. Lebeda. 2018. Biological Characteristics and Assessment of Virulence Diversity in Pathosystems of Economically Important Biotrophic Oomycetes. Critical Reviews in Plant Sciences, 37: 439-495, DOI: 10.1080/07352689.2018.1530848.

van Treuren, R., A.J.M. van der Arend, and J.W. Schut. 2013. Distribution of downy mildew (*Bremia lactucae* Regel) resistances in a genebank collection of lettuce and its wild relatives. Plant Genetic Resources, 11:15–25. https://doi.org/10.1017/S1479262111000761.

*Corresponding author. Email: gsandoyamiranda@ufl.edu