Plant Pathology Seminar Series

"Epidemiology and Management of Hop Downy Mildew"

JINGYING ZHANG

Abstract

Cultivated hop (*Humulus lupulus L.*) is an herbaceous and perennial bine grown for its female flowers (cones)(1). The commercial value of hop is the soft resins (α acid and β acid) and essential oils produced from lupulin glands within the cones, which impart critical flavor and aroma to beer and also aid in preservation (2). Most commercial hop production areas in the USA are located in the Pacific Northwest states of Washington, Oregon and Idaho, accounting for approximately 23% of the total hop acreage and 36% of the total α acid production in the world (3,4,5). Hop stunt (6), powdery mildew (PM) (7) and downy mildew (DM) are three important diseases of hop in WA. DM (caused by *Pseudoperonospora humuli*), is a serious disease of hop in the Pacific Northwest (8). The pathogen infects and overwinters in crowns as mycelium, which will invade new shoots produced by crowns in the following spring. Systemically infected shoots are called primary basal spikes, which serve as the source of infection for the growing season, producing sporangia. These spores are spread by air currents and can establish new infections on leaves, cones and shoots (secondary spikes), which will repeat the infection cycle (8,9). Complete loss of market yield mainly results from cone abortion, reductions in α acid and crown desiccation (10). Several weather factors, especially temperature and relative humidity, have been shown to affect sporulation and infection. Wet conditions, such as rain, dew, fog, or sprinkler irrigation, and mild to moderate temperatures favor DM (11,12,13). Effective disease management involves the integration of several approaches: resistant cultivars, strict sanitation practices, timely application of fungicide and cultural practices. The use of resistant cultivars is the most efficient method of DM control, but market forces dictate cultivars grown. No cultivar is completely immune, but will vary in susceptibility to the crown, leaf, shoot, and cone phases of the disease. Therefore, most hops grown in the USA are susceptible to DM (14). Fungicide programs are the earliest and most widely used strategy for DM control since 1905. However, insensitivity of *P. humuli* has been reported to several chemicals (Phenyamide, Metalaxyl and Forsetyl-Al) and the effect varies geographically. Fungicide applications are usually combined with sanitation practices (also essential for DM control)(3,14,15). In order to reduce the amount of potential primary inoculum, clean roots are used for planting, diseased hills are removed, and primary spikes are destroyed by pruning or chemicals (16). To improve the effectiveness of fungicide spray programs, disease prediction models have been developed to strategically time applications. The Washington model scheduling protective fungicide sprays has been proved to be useful in predicting and monitoring (11,12,13).

4:10 PM • Monday, October 5, 2009, • Johnson Hall 343

Plant Pathology 515, Fall, 2009

CORRECTED ABSTRACT

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