

## Managing Leaf Rust in the Evergreen Production System

Under the evergreen production system for southern highbush blueberry (SHB), which is used extensively in the south-central and central regions of Florida, blueberry plants do not go dormant and are harvested early in the season. One of the primary management necessities in the evergreen system is to keep the foliage healthy and intact through the harvest season. A significant challenge to accomplishing this can be fungal leaf disease, in particular rust, which must be managed from late fall through harvest.

Rust symptoms initially appear as small angular yellow spots which turn red to black on the upper surfaces of leaves (Figure 1). Multiple rust lesions can occur on the same leaf, turning the leaves yellow or red over time before causing defoliation (Figure 2). The most characteristic symptom of rust is clusters of yellow- or rust-colored spores produced on the underside of the leaf, opposite the lesions on the upper leaf surface (Figure 3), during extended periods of humid wet weather.



Figure 1. Rust symptoms on upper side of leaf  
Credits: P. Harmon, UF/IFAS



Figure 2. Rust symptoms on upper side of multiple leaves  
Credits: D. Phillips, UF/IFAS



Figure 2. Rust symptoms on underside of leaf  
Credits: P. Harmon, UF/IFAS

Commercial varieties differ in their susceptibility to leaf rust. The SHB varieties Jewel and Optimus are highly susceptible, meaning they will be more severely impacted by rust disease than more resistant varieties given the same environmental conditions and disease pressure. All varieties currently grown in Florida can develop leaf rust and a new collaborative project within the UF/IFAS Blueberry Breeding Program to study the disease and characterize blueberry leaf rust resistance has recently begun.

In the evergreen producing regions of the state, rust tends to be slow during the summer, becoming problematic around the end of September. Disease pressure persists all the way through harvest and summer postharvest pruning. There are other foliar disease concerns during summer than can require fungicide inputs (e.g., anthracnose and target spot), but in evergreen production, these applications don't usually give the overlapping rust protection afforded to the deciduous system. This means a longer period of time when leaves need protection, which often means more fungicide inputs are required. Once the disease becomes severe, options become fewer, less effective, and more costly.

In the evergreen system, Chlorothalonil (sold as Bravo<sup>TM</sup> and others) applications for rust management can be made starting late fall, before bloom. Chlorothalonil is a contact fungicide that cannot be used after bloom, and that some growers have concern about causing leaf burn in the heat of summer. Chlorothalonil has efficacy for several diseases and applications made when disease pressure is generally low (but as it starts to increase) make good sense. As the season progresses, growers should scout for rust disease, walking rows, turning over leaves with spots, and looking for the orange spore masses. As rust starts to increase on the interior lower canopy leaves, consider using Proline<sup>TM</sup> (prothioconazole), which has stood out in some published research as an excellent choice among DMI products for rust. Other products with reported excellent effectiveness include Quilt Xcel<sup>TM</sup> (azoxystrobin and propiconazole) and Propulse<sup>TM</sup> (fluopyram and prothioconazole). Other DMI's with longer preharvest intervals (PHI) can also be considered if rust increases before bloom (e.g., Indar<sup>TM</sup>, Tilt<sup>TM</sup>). They will have some efficacy, and this will leave Quash<sup>TM</sup> and Proline<sup>TM</sup> (with a 7 day PHI) as options for any flare-ups closer to harvest. Abound<sup>TM</sup> and Pristine<sup>TM</sup> both also have rust efficacy and make for good rotation partners with one of the DMI products. If applied at or after bloom, consider tank mixing a captan product with Abound<sup>TM</sup> or Pristine<sup>TM</sup>, because of the widespread anthracnose ripe rot resistance to these products. One or more of these options employed in the late fall to pre-bloom period should do a good job of keeping rust severity low through harvest.

Organic management options include copper products and plant-based horticultural oils. These measures will yield better results preventively than if employed once defoliation and fruit infections are common in the field. Numerous biological control products are available as well with rust efficacy claims. These may help reduce disease severity in some cases, but do not afford levels of disease control that are comparable to conventional fungicide products in research trials. Peroxide based products will kill spores that are on the surface of leaves through direct contact but have no lasting effect and rarely if ever reduce disease severity in research trials. Fungicides with different modes of action should be used in rotation or in a tank mix and as part of an integrated post-harvest foliage management strategy.

Phil Harmon, Professor, Plant Pathology, UF/IFAS

Christ Mane Belizaire, UF/IFAS

Doug Phillips, Blueberry Extension Coordinator, UF/IFAS