Red Clover Rust

Morgan Goodnight and Peng Tian,

Plant Diagnostic Clinic

The weather of this spring has been cooler and wetter than the past, which provided great conditions that favor many different types of fungal diseases. As one of important foliar diseases of a broad range of hosts including field crops and ornamental plants, rust diseases were never left out from this party. The staffs at MU Plant Diagnostic Clinic recently received a red clover sample that was confirmed being infected by a rust disease, which was added to an already-full list of these fascinating basidiomycetes.

Figure 1. Lesions caused by red clover rust on the stem Photo: Morgan Goodnight

Name: *Uromyces trifolii* var. *fallens*

Symptoms and Signs: Symptoms usually begin as yellow spots all over the leaves and stems (Figure 1). Once they become mature, these spots turn red or brown and develop into pustules that are about 2 mm long (Figure 2). These pustules can develop along the stem and over/under the leaves, and cause twisting of the stem, leaf distortion or defoliation in some cases.

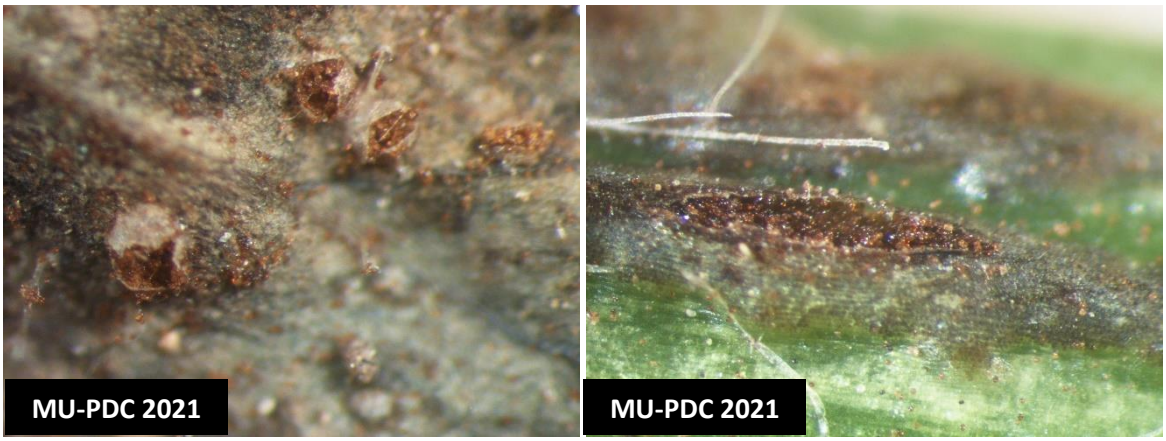

Figure 2. Rust pustules on the clover leaf and stem Photo: Peng Tian

Life cycle: Red Clover rust has up to 5 different stages as it develops. In contrast to many rust fungi that requires alternative hosts, *Uromyces trifolii* completes all the life stages in one host. It first overwinters as teliospores produced in telia. In early spring, basidiospores germinate and colonize on the leaves. As the disease progresses, urediniospores are formed from round to irregular shaped and reddish to brown colored uredia and infect the new plants repeatedly through season, causing defoliation and stem girdling (Figure 3). Cool and wet conditions favor the germination and colonization of the fungal spores. In the end of the growing season, the pustules become dark brown to black and end up in the telia stage to survive the winter.

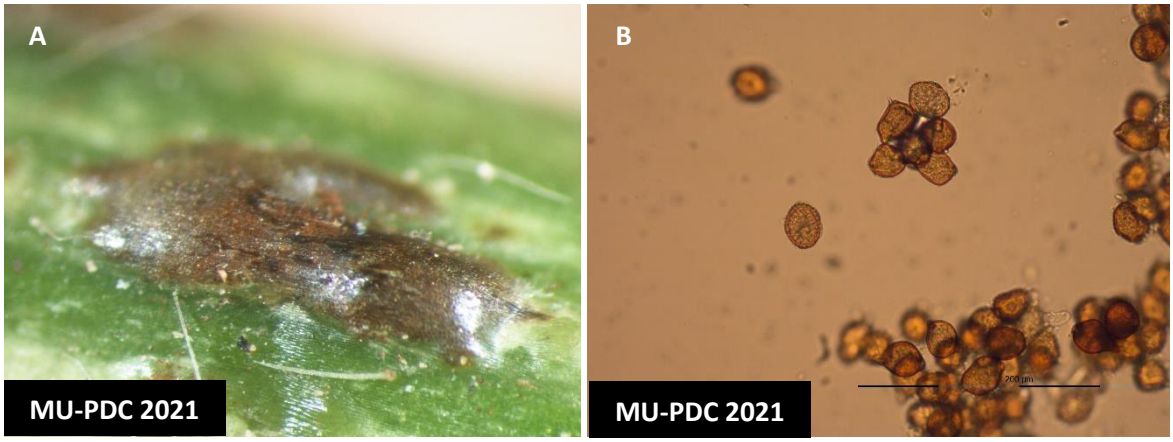

Figure 2. A) An immature pustule under the epidermis of the leaf; B) Urediniospores observed under a compound microscope 400× Photo: Peng Tian

Host range and damage: Most of Rust diseases are host specific, which means that one species of rust that infects clovers doesn't infect other crops such as wheat or soybean. There are three rust isolates that cause diseases on clover species. *U. trifolii hyhridi* infects only alsike clover, red clover rust (*U. trifolii fallens*) infects red, zigzag, crimson, Berseem and several other clovers and white clover rust (*U. trifolii trifolii-repentis*) infects crimson and Berseem as well as white clover. The impact of rust disease on the clover yield is difficult to evaluate since severe damages of this plant were rarely reported. However, as rust is a biotrophic pathogen, it can only infect the living plants, the infected plant tissues in

the field may become the inoculums that can infect the new growth in the new growing season within the year.

Disease Management:

1. **Plant a variety that is less susceptible to the rust disease.**
2. **Ensure a dry environment.** Rust thrives in cool, wet weather condition, therefore avoid overwater and maintain good air circulation.
3. **Crop rotation.** Choose another host that is not a target for red clover rust.
4. **Keep plants healthy.** This can be done by proper care including watering, fertilizing, providing a well-draining soil medium, adequate lighting, and air circulation.
5. **Chemical control is not usually recommended.** You can spray a fungicide as a prevention in the beginning of the season, but there is no known effective method once the rust has infected the plant.

References:

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