Testing Barberry For Rust Resistance

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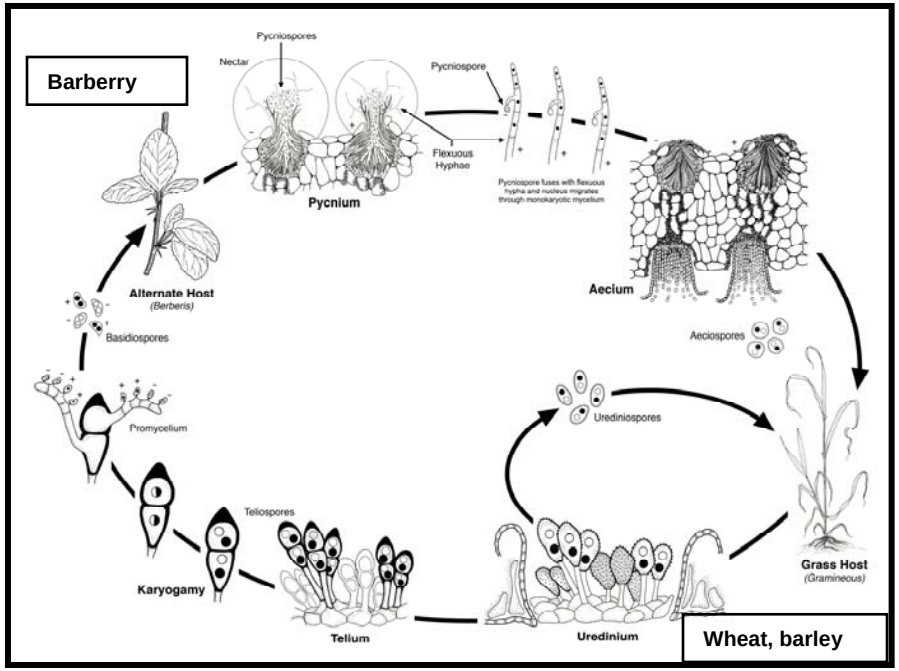
http://www.aphis.usda.gov/plant_health/plant_pest_info/barberry/index.shtml

Why do you need to screen your barberry for black stem rust resistance?



Life cycle of black stem rust pathogen
Puccinia graminis, Leonard & Szabo Mol Plant Pathol 2005

- Black Stem rust is a devastating disease of wheat, barley, rye and oats.

- Several barberry species (*Berberis, Mahoberberis, and Mahonia)* are alternate hosts of the rust pathogen.

- In nature, sexual recombination of the pathogen occurs on the alternate host often resulting in new virulent races.

- Not all barberry species, however are susceptible to rust pathogens.

- The rust screening program at USDA-ARS, Cereal Disease Laboratory is a mechanism to ensure that only rust resistant barberry cultivars or species are marketed as ornamental plants.

- Barberry species currently marketed as ornamentals by the Nursery and Landscaping Industry are resistant to black stem rust.

Step 1: Contact USDA-ARS and APHIS-PPQ

Plants should be healthy and with young leaf flushes

- Contact USDA before you plan to send the plant samples for shipping, permits and packaging details

  David.Long@ars.usda.gov

  Tel: 612-625-1284 and

  Contact your USDA-APHIS-PPQ: State Plant Health Director/Inspector

- Plants should be shipped along with the permits to:

  USDA-ARS, Cereal Disease Laboratory, 1551 Lindig Street, St. Paul, Minnesota, 55108.

- 10 replicates of each cultivar to be tested should be shipped to USDA-ARS

- For more details contact:

  - Prakash.hebbar@aphis.usda.gov
    Riverdale, MD, (301)-734-5717
  - Phillip.a.mason@aphis.usda.gov
    Ft. Collins, CO, (970)-494-7565
  - Anthony.man-son-hing@aphis.usda.gov
    Raleigh, NC, (919)-855-7331

Step 2: Provide USDA with the following details

Barberry varieties growing in the greenhouse

- Are the plants new “cultivars” and not listed in the CFR 301.38 under any other name.
- Are the plants currently marketed in the US.
- Number of cultivars that will be shipped to conduct resistance testing
- How were the plants propagated: rooted cuttings or seed raised
- Provide detailed description of stems, leaves, flowers, spines, berries and high quality digital color pictures on a CD.

Step 2: Description of morphological characteristics in addition to digital pictures should be provided

Leaf	**Color (green, yellow, purple)**	**Leaf edge smooth or spiny**	**Leaf shape**	**Single or as leaflets**
Stem	**Outer Bark** **Color of mature shoots (grey, red, brown)**	**Spines** **Present or absent**	**Number of** **spines**	**Straight or angled at the nodes**
Flowers	**Color (yellow, orange, reddish)**	**Flower stalk (racemes) short or long**	**In bunches, in pairs or single**	
Berries	**Color (red, purple)**	**Shape**	**In bunches,** **in pairs or single**	
Growth Habit	**Tall, short, bushy**	**Tap root or** **Multiple roots**	**Seed raised or rooted cuttings**	**Evergreen or** **Deciduous**

Step 3: Screening of Barberry cultivars in the Greenhouse at USDA-ARS, St. Paul, MN

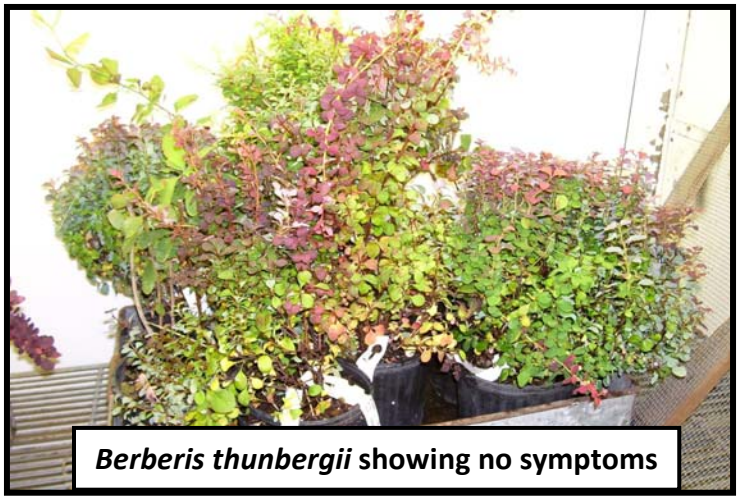
Rust Infected wheat straws are the source of pathogen spores

Wire mesh

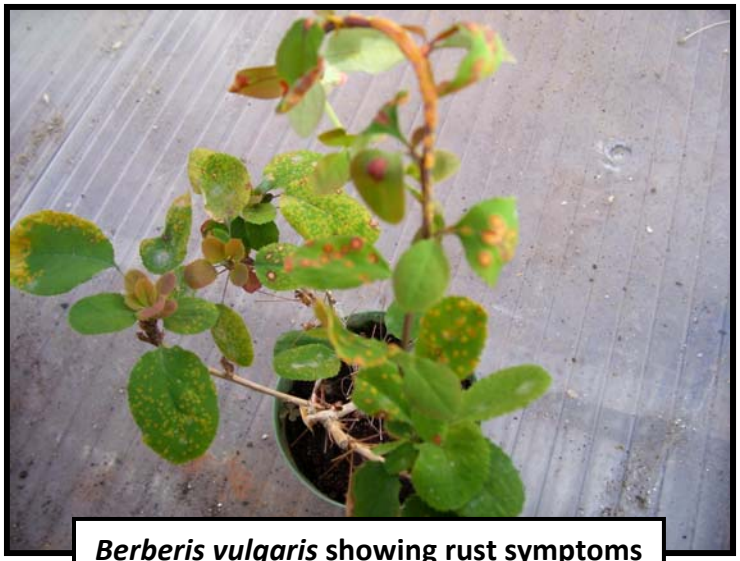
Test plants

Wheat straws infected with the rust pathogen are placed over the barberry plants and incubated in a chamber for 3-4 days at 80% humidity. Common barberry, *Berberis vulgaris* is used as susceptible control in every test performed.

Step 4: Reading Results of Rust screening tests



***Berberis thunbergii* showing no symptoms**



***Berberis vulgaris* showing rust symptoms**

- Plants showing clear rust symptoms are declared as rust susceptible
- To be certain, those cultivars showing no symptoms are truly resistant, rust screening tests are repeated, in total 10 times along with *B. vulgaris* as positive controls. Rust symptoms should always appear on the control plants.
- Results of the tests are transmitted to the Nursery that had shipped the plants and APHIS simultaneously by the Cereal Disease Laboratory
- The process (paper work) to list the cultivars as rust resistance are then initiated by APHIS-PPQ-EDP at Riverdale, MD.

Screening of Ornamental Barberry varieties for rust resistance by USDA-ARS facilitates their commercialization

David Long, USDA-ARS, Plant Pathologist

- Plan well in advance if you intend to market new barberry cultivars.
- The process takes approximately 2 years from initial screening at USDA-ARS to being listed in the Code of Federal Regulations 301.38 by USDA-APHIS-PPQ
- For further information contact:
  - Prakash.hebbar@aphis.usda.gov
  - Phillip.mason@aphis.usda.gov
  - Anthony.man-son-hing@aphis.usda.gov

  or

  APHIS State Plant Health Director in your state.