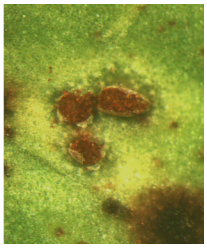
RUST

Test accepted: March 1991 **Test updated:** June 2024
Pathogen: *Uromyces striatus* Schroet. **Test author:** Donald L. Stuteville



(Click to see larger photo.)
Pustules on leaves in the field. Pustules magnified.

PLANT CULTURE

Growth Chamber/Greenhouse

Media..... Sand or soil mixture
Temp/Light..... 22 to 25°C; 1 hour photoperiod
No. of Plants ..... 30 to 50 per replication
No. of Reps ..... 3 minimum

INOCULUM CULTURE

Source ..... To reduce the possibility of culturing a single race of the fungus, urediniospores should be collected from several locations
Collection ..... For initial field collections or small tests, urediniospores for inoculum may be shaken or brushed from rusted plants; however, for larger tasks cyclone spore collectors[3,5] are very helpful
Storage ..... Urediniospores can be stored a few weeks under refrigeration (about 4°C) with little loss in germination; urediniospores newly produced in lab (98% germination) and stored at -20°C in vials covered with Parafilm germinated 88, 80, 69, 38, and 13% after 4, 8, 12, 16, and 23 months, respectively; the latent period (days from inoculation to first pustule) was 9 days with inoculum stored up to 9 months and increased to 14 days following inoculation with urediniospores stored 21 to 23 months;[1] urediniospores may be stored several years in liquid nitrogen without loss of viability[4]
Increase ..... To insure high quality inoculum, use urediniospores freshly harvested from plants grown in the greenhouse or lab

INOCULATION PROCEDURE

Age of Plant ..... Plants 3 to 5 week old, or older with vigorous regrowth
Method ..... To prepare 100 mL of inoculum add 100 mg urediniospores to 100 mL of distilled water to which two drops of Tween 20 have been added; this provides about 3.5 x 10^5 spores mL^{-1}; it is necessary to stir the mixture for at least 20 minutes to disperse the spores; the suspension is sprayed onto plants until run-off

INCUBATION

Infection..... Inoculated plants are maintained at 100% relative humidity (kept wet) at 25°C in darkness for 24 hours to permit infection; enclosure in a humidity chamber, or in plastic boxes,[5] or plastic bags, will provide adequate humidity
Temperature..... Temperature affects the genetic behavior of resistance; best expression of susceptibility is found when plants are kept at 25°C after infection
Photoperiod ..... 16 hours
Time of Rating ... 15 to 20 days after inoculation

RATING

Score the most severely infected leaflet on each plant.

1 Resistant..... No symptoms
2 Resistant..... Flecks, plus possibly a few small closed pustules
3 Susceptible..... A few flecks and closed pustules plus several small open pustules
4 Susceptible..... Many small open pustules
5 Susceptible..... Many medium to large open pustules

Plants in classes 1 and 2 are considered resistant because they prevent reproduction of the rust fungus.

The percentage of resistant plants and ASI can be used for comparisons with check cultivars.

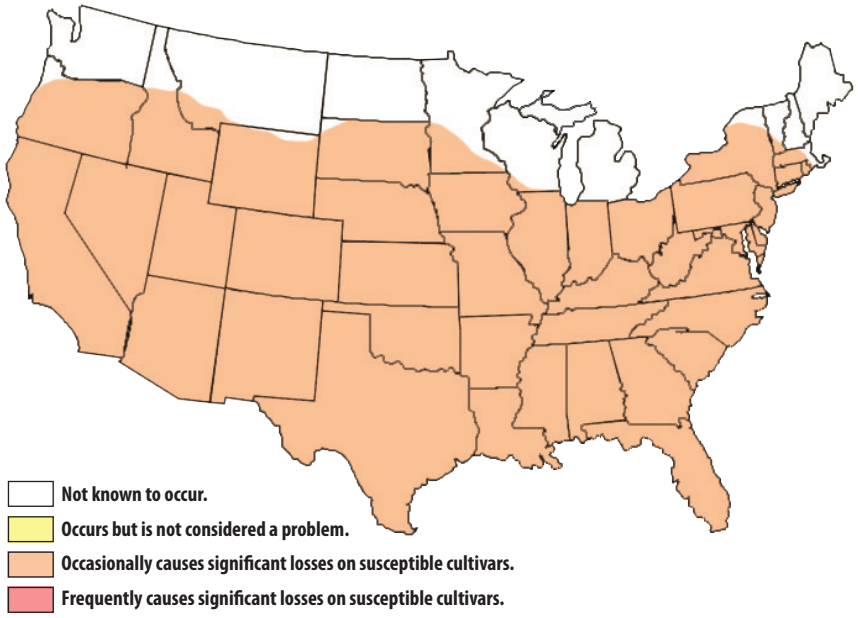
CHECK CULTIVARS

	Approximate Expected Resistance (%)	Acceptable Range of Reaction (%)
Resistant		
MSA-CW3An3	50	40-60
Susceptible		
Saranac	1	0-10
Moapa 69	10	5-15

Values for resistant standards include the total of 1's and 2's.


(Click to see larger photo.)
Range of disease symptoms.

DISTRIBUTION AND SEVERITY OF RUST



Alfalfa rust, *Uromyces striatus* Schroet.
(Click on the map above for a larger version.)

CORRELATION TO FIELD REACTION

High if the same races are involved; however, some plants resistant in the field are susceptible in the lab[5].

RACES

There are different races of *Uromyces striatus*.

HELPFUL INFORMATION

Some cyclone spore collectors and inoculation equipment developed for cereal rust research[2] work equally well with alfalfa rust.

REFERENCES

1. Al-Hamdany, M.A. 1980. Overwintering of *Uromyces striatus* Schroet. and some effects of temperature, photoperiod, moisture, and leaf age on alfalfa rust development. Ph.D. diss. Kans. St. Univ., Manhattan (Diss. Abstr. 80-24236).
2. Browder, L.E. 1971. Pathogenic specialization in cereal rust fungi, especially *Puccinia recondita* f. sp. *tritici*: Concepts, methods of study and application. USDA Tech. Bull. No. 1432, p. 26.
3. Cherry, E., and C.E. Peet. 1966. An efficient device for the rapid collection of fungal spores from infected plants. Phytopathology. 56:1102- 1103.
4. Dahmen, H., Th. Staub, and F.J. Schwinn. 1983. Technique for longterm preservation of phytopathogenic fungi in liquid nitrogen. Phytopathology. 73:241-246.
5. Skinner, D.Z., and D.L. Stuteville. 1989. Influence of temperature on expression of resistance to rust in diploid alfalfa. Crop Sci. 29:675-677.