



GERANIUM RUST

Geranium rust, caused by the fungus *Puccinia Pelargonio-zonalis*, is a serious disease of the florist's geranium (*Pelargonium x hortorum*). The disease was first reported in South Africa in the 1920s. By the 1960s it had spread to Australia, New Zealand, Europe, and Hawaii. Rust was first reported in the continental United States in California and New York in 1967. It has now been introduced into all areas of this country where geraniums are commercially grown.

The only significant host of geranium rust is *P. x hortorum*. The disease is most serious on the zonal geraniums, although it has been shown to develop on other species. Rust is usually associated with cutting geraniums, but seedling geraniums (*P. zonale* hybrid) are also susceptible. Ivy geranium (*P. peltatum*), Martha Washington or regal (*P. x domesticum*), the scented leaf types, or the wild geraniums are resistant. Geranium rust occurs mainly on the leaves, but occasionally is found on petioles and stems (Figure 1). The disease is favored by relatively cool moist conditions.



Figure 1. Early stage of geranium rust on upper leaf surface.

SYMPTOMS

Small, circular, pale yellow spots first appear on the lower leaf surface. The spots rapidly increase in diameter to 5 to 8 millimeters and turn into rust, cinnamon brown spore pustules. Within a few days one or more practical-to-complete, irregular concentric rings of rust-brown pustules form around the original (Figure 2).

Small, circular yellow spots also appear on the upper leaf surface (Figure 3) opposite the pustules on the lower surface. Small pustules may form in the center of these spots but rarely develop in concentric rings as on the lower surface. As the number of pustules increases on the lower surface, the spots on the upper surface turn brownish. Heavily infected leaves turn yellow, dry, and drop prematurely often resulting in the complete defoliation of infected plants.

DISEASE CYCLE

The rust fungus survives as yellow-brown spores (urediospores) in infected plants. Spores are dispersed by air currents, splashing water, infected or infested stock, or on the hands of workers. Germination of

For further information contact Nancy R. Pataky, Extension Specialist and Director of the Plant Clinic, Department of Crop Sciences, University of Illinois at Urbana-Champaign.

the urediospores and infection is optimum in moist, relatively cool (61° to 70°F or 16° to 21°C) conditions. Temperatures above 81°F (27°C) inhibit spore germination and pustule formation. The urediospores germinate in the presence of free water, and their germ tubes penetrate geranium leaves through the stomates. Five to six hours of free moisture are needed for a spore to germinate and infect a leaf. The period of incubation, from spore germination and penetration to the appearance of the yellow spots, varies from 7 to 10 days. An additional 7 to 9 days pass before the urediospores are released from the newly formed pustules on the lower leaf surface. Thus, the complete disease cycle from initial or primary infection through pustule formation and sporulation to secondary infections may be completed every 16 to 20 days under favorable conditions. The urediospores can remain viable for up to 12 weeks, although their viability drops off rapidly after 8 weeks.

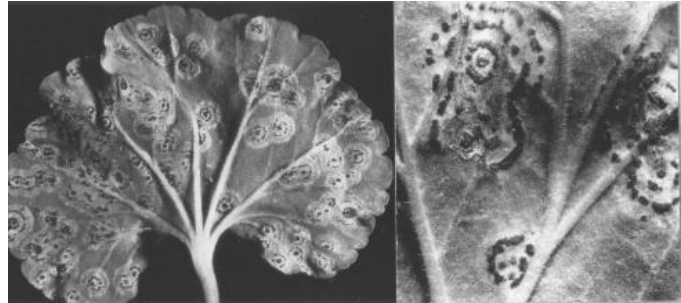


Figure 2. Left, concentric rust pustules on the lower leaf surface of a geranium leaf (courtesy BASF); right, close-up of partial to complete concentric rings of rust pustules around the original ones (courtesy Dr. F.F. Laemmlen).



Figure 2. Rust spots (lesions) on the upper leaf surface of a geranium (courtesy Dr. F.F. Laemmlen).

CONTROL

1. Purchase **only** certified, culture-indexed cuttings from a reputable commercial propagator. They cost a little more initially but are cheaper over the life of the crop.
2. Start new cuttings (or seedlings) in a greenhouse free of rust-infected geraniums. If possible, have **no** geraniums in the greenhouse for several weeks before bringing in new plantings for stock.
3. New geraniums should be kept isolated from established greenhouse stock plants for 3 weeks or longer and inspected frequently for the possible appearance of rust or other diseases.
4. Avoid carrying over stock plants from year to year, especially if they are kept outdoors during the summer. Over-summered stock is especially dangerous if other geranium growers, home plantings, or geraniums in cemeteries are nearby. Never take cuttings from field-grown plants.
5. Carefully remove all rust-infected leaves and badly affected plants on a daily basis. Place the infected leaves and plants in a plastic bag, haul it away from the greenhouse, and burn the contents.
6. Do not move different greenhouse plant types or cuttings from one greenhouse, section, or area to another in an infected house because rust spores may adhere to these plants.
7. After the growing season is over remove all remaining geranium plants and discard them in an area at least a half mile from the greenhouse. Carefully clean up and destroy all geranium debris. Steam-sterilize cutting and growing benches and fumigate the house. These practices should eliminate any viable rust spores in the greenhouse. It is best not to grow geraniums for longer than 3 to 6 months in the same greenhouse.

8. Keep the humidity in the greenhouse at 80 to 85 percent or less by increasing air movement and adding heat as temperatures fall to prevent moisture condensing on the foliage.
9. Practice only surface watering. Avoid splashing water in the foliage. If overhead watering is necessary, water in the morning on a rising temperature so the foliage will dry quickly.
10. Space the plants far enough apart to allow for good air circulation.
11. A combination of cultural and chemical controls are often required to control geranium rust. Contact fungicides should be thoroughly applied as sprays or dusts at 7- to 10-day intervals starting when rust is first evident; systemic fungicides can be applied at 2- to 4-week intervals. For suggested fungicides to use, refer to Illinois Commercial Landscape and Turfgrass Pest Management Handbook or the Illinois Home, Yard and Garden Pest Guide. Always carefully follow all label directions and precautions.