



Garlic Rust Outbreak in California, June 1998

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Situation

In the spring of 1998, severe rust disease of garlic broke out in various parts of California. While this is not the first time that garlic rust has been reported in the state, the severity, infection incidence, and geographic distribution of the problem in 1998 appear to be exceptional.

In coastal areas (Monterey and San Benito counties) and in the San Joaquin Valley, multiple fields were infected and disease incidence reached 100% in some cases. Disease severity was high and significant loss of foliage was experienced. Cool, rainy spring weather has likely encouraged the disease to develop. By May, the disease continued to spread and satisfactory control was not achieved with the few registered fungicides available for garlic, though in most cases these materials were applied after disease was already well established.

Rust is not a new disease for California, and it was observed in our state at least as early as 1934. Worldwide, the fungus causing rust on garlic has been observed on plants in the *Allium* or onion family generally wherever these crops are grown.

Symptoms

Garlic rust is readily identified. Early symptoms consist of small yellow to white flecks, streaks, and spots on leaves. As these small areas expand, the leaf tissue covering them breaks and the orange spores (urediospores) of the fungus become visible as pustules. Severely infected leaves can be almost entirely covered with pustules, resulting in complete yellowing, wilting, and drying of the leaf. As the disease progresses, a second, darker spore type (teliospores) may also occur on the same leaves, resulting in black pustules. Severe rust on garlic and other *Alliums* can cause extensive loss of foliage and subsequent reduction in bulb size and quality. On infected onion and chives, symptoms consist of small (less than 1/8 inch in diameter), white to tan spots. The orange pustules often form concentric groups on the spot periphery. Disease severity on onion and chives is significantly less severe than on garlic.

Pathogen

The garlic rust pathogen is *Puccinia porri* (the name *Puccinia allii* is a synonym or equivalent name). This fungus can infect chives, garlic, Japanese bunching onion, leek, onion, rakkyo, and shallot. The pathogen may exist in the form of different strains or races in that a particular isolate will infect certain plants in the onion family while at the same time not be able to cause disease on others. However, in our inoculation tests and field observations, we find that this garlic pathogen can infect onion and chives. In addition, the fungus that causes rust on asparagus, *Puccinia asparagi*, can infect onion, although this apparently is not commonly seen.

Disease development

The fungus probably survives as either urediospores or teliospores, with urediospores apparently being the more important source of inoculum. Urediospores are windborne and can be spread long distances. Infection and

subsequent disease development are favored by cool temperatures and high humidity. The initial source of garlic rust inoculum has not been identified in California.

Control

At this time there are no control recommendations. Resistant garlic cultivars have not yet been identified. Only a few fungicide products are currently registered for garlic, and these do not appear to be effective against the rust. Preliminary studies (using small plot field experiments) have identified some effective, but unregistered, fungicides that might be useful for rust control in future seasons.

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