

The Romans Prayed, U.S. Farmers Spray Fungicides to Save Wheat from Rust

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Wheat rust was particularly troublesome around the Mediterranean basin; Roman wheat farmers were plagued by rusts. For over 1,700 years, the Romans honored a god, Robigus the rust god, in the Robigalia, a religious ceremony held on April 25. There was a temple to Robigus three miles from Rome; the priest at this temple offered prayers and annually sacrificed a red animal (usually a dog) to appease the rust god in an attempt to spare their grain and avoid rust infections. Climate change in the first century A.D. produced wetter and cooler conditions that led to frequent, severe outbreaks of wheat rust. Crop failure followed leading to famine and social disruption that contributed to the decline of the Roman Empire.

Three different rust diseases affect wheat in the U.S.: stripe rust, leaf rust, and stem rust. Each is caused by a different fungal species but all have similar life cycles. Large spore populations build up in the southern wheat areas in the winter. The spores produced on these hosts can be carried for hundreds of miles on air currents [1]. Spores that land on wheat plants germinate and infect the plant through stomata, the natural breathing pores on the surface of leaves and stems. The rust fungus grows between host cells just under the surface. Tiny tubes penetrate host cells to withdraw nutrients. Fungus tissue proliferates beneath the epidermis and, as masses of spores are formed, the epidermis bursts and pustules erupt through the plant surface. Each pustule contains tens of thousands of spores that can be carried by the wind to infect other plants. Photosynthetic output is reduced by loss of leaf area and water loss is increased due to the cracks in the epidermis. Grain yield is reduced by interference with grain filling, which results in a reduction in the number and size of kernels and the formation of shriveled kernels [1]. Under severe disease pressure, yield can be reduced as much as 50%, although losses of 10-15% are probably more typical [2]. The first commercial use of foliar sprays for cereal rust control in the U.S. occurred in 1981 in the Pacific Northwest. That year, the use of fungicides prevented the loss of more than 52 million pounds of wheat in Washington. Similar losses were prevented in Oregon and Idaho [3]. Since then, foliar fungicides have become a part of rust control programs.

References

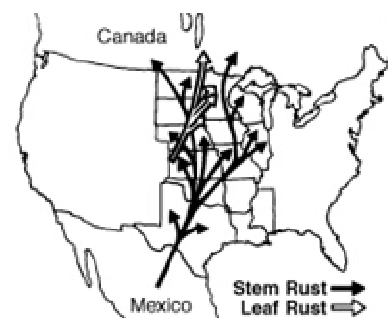
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2. Shaner, G. 1991. *Fungicide Benefits Assessment: Cereal Crops*. USDA National Agricultural Pesticide Impact Assessment Program, January.
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Wheat rust



Fungicide spraying for wheat



Dispersal of wheat rust



Texas A&M student reenacting Robigalia