



Groundnut rust

Puccinia arachidis



Photo: Mike Hughes, DAFF

Groundnut rust as it appears in the field; note that spots are mostly on the older leaves.



Photo: Mike Hughes, DAFF

Yellowing on the upper surface of leaflets (left), and pustules of rust on the underside (right).

SUMMARY: Groundnut rust is a relatively new disease to Africa, becoming widespread only since the 1970s. It affects leaves, stems and pegs, producing many small red spots or pustules containing masses of spores. Foliage turns yellow, dries up and plants die early. Infection often occurs with early and late leaf spots. When epidemics occur, pod yield losses of 40% are common. Rust spores spread over long distances by wind and also on seed, and over short distances within crops by rain-splash, and possibly by insects. Spores need water to infect. Management is primarily by removing volunteer (self-seeded) groundnut plants before planting, and by growing tolerant varieties, although keeping fields free from weeds, avoiding growing crops of different ages in the same area, site selection, rotations with cereals and possibly fungicide use are all measures to consider.

KEY SIGNS

Rust infection causes leaves to turn yellow, dry and curl, but mostly they remain attached to the plant. Once infections occur, rust develops very rapidly, faster than the diseases caused by early and late leaf spot (*Cercospora arachidicola* and *Cercosporidium personatum*). The first sign of infection is small flecks on the leaves, which develop into larger spots (or pustules as they are called) on leaves, petioles, pegs (the shoots that grow into the ground) and stems. On the leaves, the pustules are round, 0.5 to 1.5 mm diameter, and yellow at first, rapidly turning orange and then red-brown as masses of spores develop and break through the leaf surface. The pustules occur mostly on the underside of leaves, but on susceptible varieties may appear opposite them on the top surface. On the stems and petioles, the pustules are more elongate.

The rust is spread over long distances as spores during dry windy weather, but leaf wetness from rain or dew is necessary for infection, so periods of cloudy wet weather and temperatures of 20-28°C favour outbreaks of the disease. Rust spores can also be spread long distances on seed. Over short distances spread is by rain-splash and insects.

MANAGEMENT

Prevention – what to do before signs are seen

A number of measures help delay infection: removing volunteer plants from the last crop; planting new crops as far away as possible from older crops (especially those with severe rust infections) and where this is not possible avoiding planting downwind from them to avoid spread of spores from older to younger crops.

Keep weeds to a minimum; not only will weeds reduce yield of groundnuts, but also they will create conditions of high humidity around groundnut plants that favours rust infection.

There are varieties with different tolerance to rust that have been bred at ICRISAT, the International Crop Research Centre for the Semi-Arid Tropics. Since the mid-1980s, over 60 ICRISAT improved varieties have been released in 22 African countries, with some combining tolerance to rust and leaf spots. Check if these are available from local seed suppliers.

If the measures outlined are not effective or tolerant varieties are not available, rotate groundnuts with other crops to create a break from recycling rust from one crop to another. A rotation of groundnuts followed by two cereal crops, one after the other, is recommended.

Control – what to do after signs are seen

Cultural approaches: After harvest, all plant debris should be collected and destroyed, or used as fodder. The rust fungus will not remain alive in old vines or in the soil, but will survive on volunteer plants (those that are self-seeded).

Chemical approaches: Carry out regular inspections, at least twice a week, and spray when plants are first seen with infections. Do not wait until the plants are heavily infected before applying fungicide.

Begin to spray as soon as rust spots are seen, even if they appear on only one or a few plants. Spray at regular intervals: 10-14 days is best, continuing until 14 days before harvest. Spray more often if the first treatment is late, and there are many plants with rust spots. In most cases, spraying should begin no later than 30-35 days after planting. Use chlorothalonil. It is effective against rust, and also leaf spot diseases.

In an effort to reduce pesticide use, ICRISAT has been trying out integrated disease management practices based on tolerant varieties, seed dressings (using thiram plus bavistin at 2.5g per kg seed) and a single spray of chlorothalonil at 65-70 days.

CAUSE

Groundnut rust is caused by *Puccinia arachidis*. In general, rust fungi have complex life histories, with several different types of spore, some of which occur on different host plants. Groundnut rust is unusual in that there is mostly only one type of spore – urediniospores – and it occurs only on groundnuts, although another type of spore has been seen very occasionally on wild *Arachis* species in South America.

IMPACT

In many regions of the world, including Africa, rust can cause pod yield losses up to 40% when an epidemic occurs. Infected plants mature 2-3 weeks earlier than if they were healthy. In general, losses are highest when attack occurs early. In most growing areas, the disease is severe when it occurs together with early and late leaf spot diseases. Apart from loss of pod yields, there are also reductions in the amount and quality of foliage used for fodder. In Nigeria, there are reports of reduction in protein content of fodder from 16 to 12%.

DISTRIBUTION

Groundnut rust was considered a disease of South America prior to 1970, but since then it has spread around the world wherever the crop is grown. It is now common throughout sub-Saharan Africa.

FURTHER READING

Goyal A, Manoharachary (Eds) (2014) Future challenges in the crop protection against fungal pathogens. Springer New York Heidelberg Dordrecht London.

(http://books.google.com.au/books?id=iDRxBAAQBAJ&pg=PA4&lpg=PA4&dq=cereal-cereal-groundnut+crop+rotation.&source=bl&ots=zcAd_8CGNO&sig=nnZawCNj7wFCaDd3ZdJHHQxsgwQ&hl=en&sa=X&ei=OLt8VI_1D4Xy8gWY3YHoAQ&ved=0CCgQ6AEwAQ#v=onepage&q=cereal-cereal-groundnut%20crop%20rotation.&f=false)

Oiling the wheels of groundnut production. Integrated disease management technologies in groundnut for more pods, nutritious crop residue-fodder, income, and livelihood in the Deccan plateau. Research Into Use.

(<http://www.researchintouse.com/nrk/RIUinfo/PF/CPF15.htm>)

Plantwise Knowledge Bank. Groundnut leaf rust (*Puccinia arachidis*).

(<http://www.plantwise.org/KnowledgeBank/Datasheet.aspx?dsid=45745>)

Puccinia arachidis. CABI Crop Protection Compendium. (<http://www.cabi.org.ezproxy.library.uq.edu.au/cpc/datasheet/45745>)