MANAGING LEAF DISEASES IN PEANUTS FACT SHEET

GRDC Grains Research & Development Corporation

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New varieties add another tool in leaf disease management

The new peanut variety, Sutherland(ф), has demonstrated significantly higher levels of resistance to rust (*Puccinia arachidis*) and late leaf spot (*Cercosporidium personatum*) than currently grown varieties, such as Menzies(ф) and Holt. It gives growers another method of managing leaf disease in peanut crops.

KEY POINTS

- Early leaf spot and late leaf spot are major threats in most peanut areas and flourish under high rainfall and sprinkler irrigation.
- Rust in peanuts is a serious disease in Queensland coastal cane regions, and diseases like the leaf spots cause major crop losses if they start early and are uncontrolled.
- Good disease management is essential, starting with paddock selection and control of volunteer peanut plants between growing seasons.
- Sutherland(ф), a new runner type semi-erect peanut variety, has significantly higher levels of resistance (tolerance) to rust and late leaf spot compared to currently grown varieties. However, Sutherland(ф) is not completely resistant to these leaf diseases, and can experience significant losses under high disease pressure if the diseases are not managed early.

PHOTO: JEFF TATNELL, DEEDI

Sutherland(ф) has significantly higher levels of resistance to rust and late leaf spot compared to currently grown varieties.

Early and late leaf spot

The spores of both early and late leaf spot are spread by wind and rain. However, as the residue of previous peanut crops is the main method of survival of the pathogens between seasons, peanuts following peanuts are often the most severely affected.

The symptoms of early leaf spot are small, dark spots that become brown to black on both sides of the leaf as they enlarge up to 10 millimetres. There may be a yellow halo around the spots. Spots appear on the lower leaves first, but are not visible for seven to 10 days after infection. Symptoms of late leaf spot are similar, but spots do not have a prominent yellow halo, and masses of spores are often seen on the underside of the leaf. Lower leaves are infected first, and infection is only noticed if the dense peanut canopy is parted. Later, leaf petioles, stems and pegs may also become infected. Leaves must be wet from rain, dew or irrigation for long periods to trigger infections.

What's the damage?

Leaves fall off and stems and pegs are weakened if the epidemic starts early, is uncontrolled, and weather conditions favour disease spread. Conditions favouring rapid crop growth also favour the development of disease. Yield potential is reduced when infected leaves fall off. Harvesting losses increase as infected pegs lose strength and break during pulling and threshing.

Rust

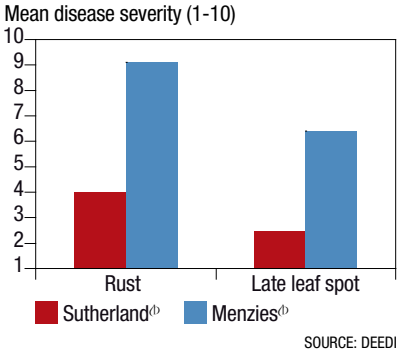
Unlike the leaf spots, spores of rust can travel long distances between crops. Infection starts from infected volunteer plants, because rust can survive only on living peanut plants.

The first signs of infection are small yellow flecks on the leaves, which soon develop into small orange pustules. The pustules contain numerous red-brown powdery spores that are spread during dry, windy weather. However, like the leaf spots, prolonged leaf wetness from rain, irrigation or dew is necessary for infection.

What's the damage?

Initially, rust is usually found as 'hot spots' in a crop, but if not successfully controlled early it will rapidly spread, and major crop losses can be expected.

FIGURE 1 Tolerances of Sutherland(ф) and Menzies(ф) to the rust and late leaf spot pathogens



SOURCE: DEEDI

Data from trials at Bundaberg (rust) and Kairi (late leaf spot) in 2006 and 2007.
1 = no disease, 10 = defoliation.

Level 1, Tourism House | 40 Blackall Street, Barton ACT 2600 | PO Box 5367, Kingston ACT 2604 | t. +61 2 6166 4500 | f. +61 2 6166 4599 | e. grdc@grdc.com.au | w. www.grdc.com.au

Rust: these small raised spots indicate rust infection.

PHOTO: DEEDI

Late leaf spot: small dark spots indicate leaf spot infection.

PHOTO: PCA

Management strategies in leaf disease susceptible peanut varieties (such as Menzies$^{\phi}$ and Holt)

Total prevention is not possible. Peanut volunteers on headlands and in rotation crops can carry the diseases, and infected residues from last year's crops can be a source of the leaf spot pathogens.

A three-pronged approach must be taken to manage leaf diseases in all peanut varieties – control of volunteer peanut plants that may harbour the leaf spot and rust pathogens, careful paddock selection, and an appropriate fungicide spray regime. Avoid planting peanuts in the same paddock as last year and beside paddocks where peanuts were grown last year, particularly if late leaf spot was present in the previous crop.

Both diseases can be controlled by the same fungicides. In high rainfall and irrigation areas, the first fungicide spray should be applied before symptoms of disease are evident (preventative spray), often as early as four weeks after planting. In most regions a spray schedule of 14 days is suitable, but under high disease pressure, that period may have to be reduced to 10 days. The schedule must be established according to weather conditions as leaf disease epidemics have the potential to increase rapidly during warm, wet weather or overhead irrigation. Fungicides also break down more quickly under these conditions and a shorter interval between sprays must be used to protect new foliage.

Some fungicides only provide protection, while others can control infections that took place three to six days before application. These fungicides will not control well-established infections. Check on Infopest, with local extension officers or relevant websites (see Useful resources) for product capabilities, recommendations and application techniques.

Spray up to four weeks prior to harvest. When choosing fungicides consider other diseases in the crop and whether the crop will be baled for hay. Follow label recommendations for product rotation and withholding periods.

A new solution – Sutherland$^{\phi}$

Genetic tolerance offers an additional solution to the management of the major foliar diseases of peanuts in Australia, with Sutherland$^{\phi}$ being the first Australian-bred variety with such tolerance (Figure 1). Research has demonstrated that Sutherland's$^{\phi}$ rust tolerance is based on physiological mechanisms involving a delay in the appearance of pustules and smaller pustules producing fewer spores. These factors result in a slower rate of rust development on Sutherland$^{\phi}$ than on susceptible varieties such as Menzies$^{\phi}$.

Between 2006 and 2009 trials were conducted at DEEDI Bundaberg and Kairi (north Queensland) research stations to evaluate the potential for reducing the number of fungicide sprays on Sutherland$^{\phi}$ compared to susceptible varieties.

All trials were planted in mid-December and compared different combinations of timing x frequency of fungicide (chlorothalonil or azoxystrobin + cyproconazole) applications on Sutherland$^{\phi}$ (all years) and Menzies$^{\phi}$ (2006, 2007). Rows of Menzies$^{\phi}$ were sown between plots to ensure that the entire trial was exposed to the same level of disease pressure.

In 2006 and 2007, spraying commenced early (four or five weeks after planting) or late (eight or nine weeks after planting), and thereafter at 14 or 21 day intervals. In 2008, spraying started 10 days after the first appearance of rust or late leaf spot on Menzies$^{\phi}$, while in 2009, spraying started when rust was first found on Menzies$^{\phi}$.

There were differences in the development of rust on Sutherland$^{\phi}$ at Bundaberg between seasons. In 2006, 2007 and 2009, rust first appeared in Sutherland$^{\phi}$ eight to nine weeks after sowing, developing slowly over the next four weeks then increasing rapidly.

In 2008 rust developed rapidly from the time that the disease was first observed (Figure 2).

Weather conditions had a significant influence on rust development – 2008 was wetter and cooler than 2006 and 2007 and more rain fell on more days in the period seven to 12 weeks after sowing in 2008 than in other years.

Although the rainfall total for 2009 was higher than in 2008, less rain fell on fewer days in the critical seven to 12 weeks after sowing than in 2008. (Table 1).

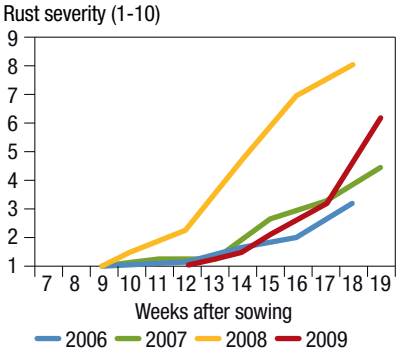
TABLE 1 Selected weather data recorded at BSES Bundaberg (opposite DEEDI research station) between 1 January and 30 April, 2006–2009

Year	Average daily temp (ºC)		Rainfall (mm)		Number of rainy days	
	Max	Min	Total	7-12 was*	Total	7-12 was*
2006	30.0	21.1	382	114	38	11
2007	29.9	20.5	254	172	25	14
2008	28.5	19.8	590	361	37	17
2009	29.3	21.1	614	265	44	12

* was = weeks after sowing

An illustration of rust on Sutherland$^{\Phi}$ (left) vs rust on a susceptible variety (Menzies$^{\Phi}$, right).

FIGURE 2 Rust development on unsprayed Sutherland$^{\Phi}$ at Bundaberg Research Station over four years



Rust development on unsprayed Sutherland$^{\Phi}$ at Bundaberg Research Station over four years.
SOURCE: DEEDI.

KEY FINDINGS AND CONCLUSIONS FROM THE TRIALS:

- spraying Sutherland$^{\Phi}$ before leaf diseases appeared in Menzies$^{\Phi}$ did not significantly improve disease control or pod yield in most years;
- delaying spraying Sutherland$^{\Phi}$ for 10 days after the appearance of diseases on Menzies$^{\Phi}$ resulted in a significant increase in disease levels and decrease in pod yield;
- good fungicide management early in the development of leaf diseases on Sutherland$^{\Phi}$ is essential;
- spray intervals of 14 to 21 days were sufficient for effective management of leaf diseases on Sutherland$^{\Phi}$;
- in most years the number of sprays needed for effective management of leaf diseases on Sutherland$^{\Phi}$ can be reduced to three to four sprays compared to seven to eight sprays for leaf disease-susceptible varieties such as Holt and Menzies$^{\Phi}$; and
- although in some trials the pod yields of Sutherland$^{\Phi}$ treated with three or four sprays commencing at the first sign of disease was slightly less than treatments with a full spray schedule (seven sprays), the gross margins were usually the same due to a reduction in the number of sprays.

Bundaberg field trial: in trials Sutherland$^{\Phi}$ (left) showed greater resistance than Menzies$^{\Phi}$ (right).

PHOTOS: COURTESY DEEDI

Kairi field trial: the affect of disease on Menzies$^{\Phi}$ (left) compared with Sutherland$^{\Phi}$ is illustrated in the Kairi Field Trial.

Recommendations for management of leaf diseases on Sutherland$^{\phi}$

Agronomy

Follow pre-planting practices of controlling peanut volunteer plants, and selecting low-risk paddocks (in or adjacent to paddocks where peanuts were not grown the previous season) outlined for susceptible varieties.

Fungicide management in low-risk situations

- to detect the presence of leaf diseases, plant a 'sniffer' row of a susceptible variety on the up-wind side of the paddock and on sides adjacent to susceptible varieties;
- monitor 'sniffer' rows every week for symptoms of rust and leaf spots, commencing four weeks after sowing; when rust or leaf spot is found immediately spray the Sutherland$^{\phi}$ crop with a registered fungicide, and destroy the 'sniffer' rows;
- apply another spray 14 to 21 days later depending on the weather, and monitor closely; apply additional sprays if necessary; and
- follow label recommendations for application, fungicide resistance, and withholding periods.

Fungicide management in high-risk situations

High-risk situations are those where peanut crops are planted in or beside paddocks in which last year's peanut residue remains, and/or where volunteer peanut plants are growing (including cane crops).

- Treat Sutherland$^{\phi}$ as a susceptible variety in these situations and apply a fungicide spray at four to five weeks after sowing, followed by another 14 days later;
- monitor carefully and apply additional sprays when necessary; and
- follow label recommendations for application, fungicide resistance and withholding periods.

Frequently asked questions

Q. Will there be more resistant varieties available in the future?

Yes. Despite its tolerance to leaf diseases, the yield potential of Sutherland$^{\phi}$ under some growing conditions is up to 20 per cent lower than well-managed crops of other varieties. New, ultra-early (15-weeks maturity) varieties with the same high levels of tolerance to rust and late leaf spot and with improved agronomic features, will be released for commercial production in the 2010–11 season. Few fungicide sprays will be needed to manage leaf diseases on these ultra-early varieties. New full season varieties with similar foliar disease tolerance to Sutherland$^{\phi}$ and higher yield potential will be released for commercial production in the next few years.

Q. Are there any problems with fungicide resistance?

There is no evidence of resistance in the peanut leaf pathogens to the currently registered fungicides in Australia or overseas. With the reduced number of fungicide sprays needed for effective management of these diseases on new varieties such as Sutherland$^{\phi}$ compared to susceptible varieties, the potential for fungicide-resistant isolates to develop is significantly reduced.

Q. Does planting a 'sniffer' row of a susceptible variety attract disease to the crop in that area?

No, as spores of the foliar pathogens are airborne, the 'sniffer rows' only indicate the presence of these airborne spores and that conditions have been conducive for infection. Once foliar diseases are detected in these 'sniffer rows' they should be removed.

Q. Does tolerance diminish if you plant two successive Sutherland$^{\phi}$ crops?

No, the tolerance of Sutherland$^{\phi}$ to the foliar pathogens appears to be conditioned by a number of different genes in the plant, so the tolerance of Sutherland$^{\phi}$ will not diminish if crops are planted in successive seasons. There is a remote possibility that new strains of the pathogens that can overcome these tolerance genes in Sutherland$^{\phi}$ might develop, but this scenario is highly unlikely due to the nature of the tolerance.

Useful resources:

Queensland Government

Dr Malcolm Ryley, Principal Plant Pathologist, DEEDI	**07 4688 1316, Email malcolm.ryley@deedi.qld.gov.au**
Peter Trevorrow, Senior Plant Pathologist, DEEDI	**07 4048 4677, Email peter.trevorrow@deedi.qld.gov.au**
Jeff Tatnell, Senior Experimentalist, DEEDI	**07 4160 0743, Email jeff.tatnell@deedi.qld.gov.au**
The Peanut Company of Australia	**www.pca.com.au**
The Department of Employment, Economic Development and Innovation (DEEDI)	**www.deedi.qld.gov.au**
Peanut and Navy Bean Disorders: the Ute Guide	**Ground Cover Direct, 1800 11 00 44**
Infopest is a national database for farmers, commercial sprayers, consultants, chemical companies and educators on responsible chemical use	**07 3239 3941**

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