Keeping ahead of wheat rusts

Norbert H. Luig

Follow this and additional works at: https://researchlibrary.agric.wa.gov.au/journal_agriculture4

Recommended Citation
Available at: https://researchlibrary.agric.wa.gov.au/journal_agriculture4/vol22/iss4/4

This article is brought to you for free and open access by Research Library. It has been accepted for inclusion in Journal of the Department of Agriculture, Western Australia, Series 4 by an authorized administrator of Research Library. For more information, please contact jennifer.heathcote@agric.wa.gov.au, sandra.papenfus@agric.wa.gov.au.
IMPORTANT DISCLAIMER

This document has been obtained from DAFWA's research library website (researchlibrary.agric.wa.gov.au) which hosts DAFWA's archival research publications. Although reasonable care was taken to make the information in the document accurate at the time it was first published, DAFWA does not make any representations or warranties about its accuracy, reliability, currency, completeness or suitability for any particular purpose. It may be out of date, inaccurate or misleading or conflict with current laws, polices or practices. DAFWA has not reviewed or revised the information before making the document available from its research library website. Before using the information, you should carefully evaluate its accuracy, currency, completeness and relevance for your purposes. We recommend you also search for more recent information on DAFWA's research library website, DAFWA's main website (https://www.agric.wa.gov.au) and other appropriate websites and sources.

Information in, or referred to in, documents on DAFWA's research library website is not tailored to the circumstances of individual farms, people or businesses, and does not constitute legal, business, scientific, agricultural or farm management advice. We recommend before making any significant decisions, you obtain advice from appropriate professionals who have taken into account your individual circumstances and objectives.

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia and their employees and agents (collectively and individually referred to below as DAFWA) accept no liability whatsoever, by reason of negligence or otherwise, arising from any use or release of information in, or referred to in, this document, or any error, inaccuracy or omission in the information.
As every Western Australian farmer knows, rust could do serious damage to wheat crops in parts of the Northern and Southern Agricultural Divisions of Western Australia if resistant varieties were not available. However, this resistance is constantly being overcome by new rust races (strains), so the industry needs a continuous supply of varieties with new sources of resistance.

Of the two types of rust diseases that occur in Western Australia, stem rust, caused by the fungus *Puccinia graminis tritici* is by far the most widespread and economically damaging. Leaf rust caused by the fungus *Puccinia recondita* is a relatively minor problem. A number of strains occur in both types, each characterised by its ability to attack a particular type of resistance. Therefore breeding a resistant cultivar involves using sources of resistance which are effective against the prevalent strains. Annual surveys of rust races are necessary to guide wheat breeders on the choice of resistance sources for their programmes.

Each year the Department of Agriculture surveys races of rust in Western Australia, in co-operation with the Plant Breeding Institute of the Sydney University. Rust samples collected throughout the State are sent to Sydney where they are multiplied and used to infect four standard sets of wheat varieties. Then each collection of rust is classified according to the wheat varieties it can attack, and is grouped with similar races both nationally and internationally.

In Australia a rust strain is given two sets of identification numbers. For example, a stem rust strain 21-1, 2 is number 21 in the international classification and attacks sources of resistance 1 and 2 of the Australian supplementary test wheats.
Stem rust

During the period 1951-65, 13 stem rust strains were identified in Western Australia. In 1965 strain 21-1, 2 was responsible for the 1963 rust epidemic, dominated the rust population in Western Australia. This race persisted till 1976 reaching a new peak in that year.

However, in 1969 a new strain designated 21-2, 3, 4, 7 and capable of attacking Gamanya and Mengavi wheats, appeared at Salmon Gums and Esperance and became dominant. It accounted for two-thirds of the collections made in 1970.

Another strain designated 326-1, 2, 3, 5, 6 appeared in 1970, established itself in the following year, and became a dominant strain.

Since 1974, strain 21-2, 3, 7 which is similar to 21-2, 3, 4, 7 but more adapted to Gamanya has become dominant, together with 326-1, 2, 3, 5, 6. This may be due to the large area sown to Gamanya.

Strains 21-2 and 34-2, incapable of attacking Gamanya, still persist on susceptible varieties such as Falcon, Heron and Insignia. In 1980, strain 34-2 was the most common amongst the relatively fewer samples obtained.

Strain 343-1, 2, 3, 5, 6 detected here in 1974, 1978 and 1980 is now dominant in the Eastern States. It is an aggressive strain capable of attacking many sources of resistance and is being watched carefully.

The reasons for changes in the rust population in Western Australia are not clearly understood. Some new strains occur spontaneously through mutation. Movement of spores from State to State may also be important as rust can be blown by prevailing winds over long distances. Although east to west exchange of spores is rare because air currents over Southern Australia move predominantly west to east, it may nevertheless occur. Strain 326-1, 2, 3, 5, 6 for example, may have come from South Australia. Also it is possible that rust spores could have been transported from the African continent in the prevailing jet stream.

Sudden changes in the rust strains in Western Australia have occurred six times since 1926. Most had wide-ranging implications for varietal recommendations. Surveys since 1966 detected relatively larger numbers of strains (39) than the preceding 45 years (13), suggesting great potential changes in future.

Leaf rust

The relative insignificance of leaf rust in Western Australia is evident from the few specimens identified carrying leaf rust each year. Four strains were identified during the period 1951 to 1965, the most common being 135-1, 2. There were no leaf rust samples among the collections made during 1966 to 1970 and 1977. In other years, seven new strains were detected. Also 135-2, one of the few strains identified during 1951 to 1965 was again detected in one sample during 1971. Most of the strains identified during 1966 to 1979 were prevalent in the Eastern States before their detection in Western Australia. This is further evidence of east to west rust movement.

National rust control programme

Stem rust

Breeding for stem rust resistance is now co-ordinated nationally through the National Rust Control Programme based at the University of Sydney. It aims at replacing all existing susceptible cultivars with resistant ones, and minimising the chances of rust build-up throughout Australia. Fortunately, most of the wheat growing area in this State is not prone to rust damage, which explains why the National Programme aims at breeding resistant varieties for coastal areas.

Among wheat varieties grown in Western Australia, Madden, Warimba, Kite and Eagle are recommended for rust-labile areas. Of these Madden and Kite are resistant to all known stem rust strains in Australia. Egret and Halberd are susceptible to most strains but resistant to the most prevalent race 21-2, 3, 7. Warimba is susceptible to some strains now present in South Australia.

Of the new wheats to be released to farmers in 1982, two, Eradu and Wialki, are rust resistant. Eradu will be released in the Northern wheatbelt as a replacement for Madden, and Wialki will be released in low rainfall areas, primarily as a hard wheat. In the low rainfall areas, which are less rust-prone, Wialki's resistance will have no advantage.

Breeding high yielding varieties resistant to stem rust is in progress. A high degree of resistance is being bred into Tincurrein, Miling and other varieties which may be released in the near future.

Leaf rust

Gamanya is resistant to leaf rust strains 135-2 and 10-1, 2, 3, 4 but is susceptible to all other strains, whereas Egret carries resistances to all current Western Australian strains of leaf rust. Varieties Falcon, Madden, Insignia, Halberd, Heron, Gambee and Darkan are susceptible to leaf rust. The soft wheat variety Tincurrein also is very susceptible. However, the susceptibility of wheat cultivars to leaf rust is of little significance in Western Australia.

Further reading
