

## About PBI

### History

The Plant Breeding Institute was established in 1953 to ensure a continuing University commitment to wheat research. The University of Sydney has conducted research on the rust of wheat continuously since 1920 when W.L. Waterhouse was appointed to the Faculty of Agriculture. The comprehensive work of Professor Waterhouse laid the foundations of our current knowledge of these fungal diseases.

Professor Irvine Watson continued Waterhouse's work and it was Professor Watson who purchased the original property of eleven hectares at Castle Hill. He leased the research site to the University until 1953, when a Flour Millowners association of NSW donation to the University purchased 8.5 hectares of the property. The remainder of the Watson land was purchased by the University the following year. Rust research was carried out at Castle Hill, with Professor Bob McIntosh leading the Cereal Rust Group following Prof. Watson retirement in 1977.

By the early 1980's, the facilities and space available at Castle Hill were limiting the scope of work that was desired. A decision to relocate the Institute was made in 1982; a search for an appropriate new site was commenced. A new site was identified on the Cobbitty side of the Nepean River on the Camden campus site and development of the Camden site was commenced in January, 1989. The new research laboratories and office complex was officially opened in September 1991.

## Narrabri

The Plant Breeding Institute, Narrabri was originally established as the Northwest Wheat Research Institute in 1958. The land was purchased by the wheat growers of the Northwest slopes and plains from newly introduced state levies in 1957. The ownership was then transferred to a trust controlled by the NSW Wheat Research Foundation, that leases the property to the University of Sydney for the purpose of conducting grains research and development.

The Narrabri campus has 300 ha of fertile, irrigable land which is available for planting the breeding nurseries for selection for agronomic attributes, the conduct of yield and quality testing and pure seed production. This is complemented by laboratories, storage and workspace for the conduct of the routine operations of a breeding program.

The Plant Breeding Institute, Narrabri was named the I.A. Watson Grains Research Centre in 1977.

## Agroecosystems

The Agroecosystems group seeks to understand the integrated behaviour of the soil-plant-atmosphere system as it affects the flow, efficiency and resilience of resources including carbon and water. We link lab and field studies with experimental and powerful computational approaches to study how the complex interactions between the different components of the system impact on sustainable food and associated ecosystem services in the immediate and long-term. This is particularly important in meeting the challenges presented by environmental change including both natural and anthropogenic sources of climate variation, in the regeneration of degraded land and water, and development of sustainable agricultural technologies. The carbon and water flows that are essential to plant growth are regulated by processes at the leaf-atmosphere and plant-soil boundaries. We are unique in studying the biophysical interactions at both of these interfaces, as well as the crucial regulatory feedbacks between them. We study these processes in both agricultural and natural ecosystems, and since fire is such a crucial feature of the Australian landscape that regulates water and carbon flow, forest fire systems are particular focuses of our work.

For further information please contact:

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THE UNIVERSITY OF  
SYDNEY

**Plant Breeding Institute**  
*established 1953*

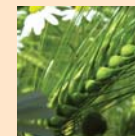
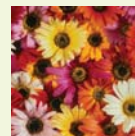
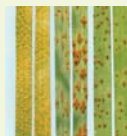
*A Leading International Centre for  
Research, Teaching and Services in Plant Breeding*

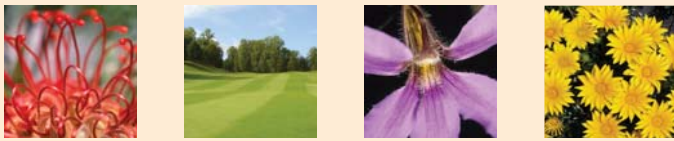
**Cereal Rust Laboratory**

**Crop Breeding & Genetics**

**Horticultural Breeding**

**Agroecosystems**





## Horticulture

Horticultural breeding and associated research on cytology, embryology, pathology, propagation, culture and sustainable production form an important part of the work of the Plant Breeding Institute. The breeding programs are all based on the philosophy of releasing "minimum input" varieties in response to the decreasing availability of resources, the need to protect the environment and the likelihood of unfavourable changes in climate. This approach involves breeding plants that have reduced requirements for water, fertilizer and pesticides, and where possible, simpler cultural requirements. Biodiversity protection is also important and promising new lines are carefully assessed before release to ensure that they do not have weedy tendencies.

Breeding activity is centred on the following key areas:

(i) herbaceous ornamentals, (ii) turf grasses, and (iii) horticultural crops.

Each of these areas is based on industry orientated breeding programs supported by staff and post-graduate student research.

Herbaceous ornamentals are mainly bred through PBI's joint venture company, NuFlora International, which has achieved a global market for its cultivars of a number of species particularly Marguerite Daisies (*Argyranthemum*) and Petunias. The other areas are bred through the Institute's Amenity Horticulture Unit with funding from a range of sources including research contracts with industry and co-operative arrangements between PBI, industry and Government agencies. In addition, background scientific research is supported by competitive grants from the Australian Research Council (ARC), Government R & D Corporations and donations.

Educational activities include supervision of students for the research degrees of PhD and MScAgr, supervision of higher degree students on placement from overseas universities, contributions to the Bachelor of Horticultural Science degree through teaching in the field of amenity horticulture and supervision of some final year research projects, and industry extension talks and field days.



## Cereal Rust Laboratory

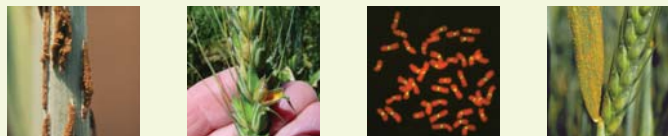
The Cereal Rust Laboratory hosts the Australian Cereal Rust Control Program (ACRCP, established in 1973), which continues one of the longest running continuous research efforts at the University of Sydney. It is involved in cereal rust research with a very strong emphasis on disease control by resistance breeding. The University's involvement in this area dates back to the 1920s.

The current program is funded largely by the grains industry, through the Grains Research Development Corporation (GRDC). It has a national mandate with an international focus, with 8 senior scientists, 9 technicians and currently 8 PhD students, is one of the largest groups involved in cereal rust research in the world. This has been recognised with senior scientists in the ACRCP involved in several high level international collaborative programs on rust diseases.

The program monitors cereal rust pathogens throughout Australia, finds and characterises new sources of rust resistance, and assists Australian cereal breeding groups to incorporate rust resistance in new cultivars. An economic analysis of the value to the Australian wheat industry of rust resistance made in 1988 estimated this to save the industry some \$289 million per year. The ACRCP is a significant contributor to this effort.

The functional components of the ACRCP are:

- Pathogenicity Surveys
- Host Resistance Surveys
- Germplasm Screening and Enhancement



## Crop Breeding & Genetics

Activities include breeding for:

- Dual purpose triticale for both grazing and grain supported by the GRDC, high yielding spring triticale with high metabolizable energy funded by the Pork CRC and hybrid triticale (support by GRDC and the Pork CRC).
- Indian mustard (*Brassica juncea*) suitable for biodiesel production funded by ARC, Australian Agricultural Crop Technologies, RIRDC and Rural Independence.
- Specialty wheat germplasm including traits such as low GI, low polyphenoloxidase, reduced screenings, crown rot resistance, durable rust resistance and tolerance to drought.
- Triple rust resistant Indo-Australian wheat germplasm developed using molecular markers and traditional rust screening supported by ACIAR.
- Cold tolerant rice suitable for planting under water limited conditions funded by RIRDC.
- Evaluation of field peas suitable for the northwestern plains of NSW supported by GRDC and the development of high yielding field peas with improved metabolizable energy in collaboration with Plant Research New Zealand and supported by the Pork CRC.

These research activities are supported by a wheat doubled haploid program, field sites at Camden, Narrabri, and additional collaborator sites in NSW and interstate. The programs involve close collaboration with the Cereal Rust Laboratory, NSW Agriculture (Elizabeth Macarthur Agriculture Institute, Tamworth and Cowra), Australian Grain Technologies, LongReach Plant Breeders, Plant Research New Zealand, the International Maize and Wheat Improvement Program (CIMMYT), the International Center for Agricultural Research in the Dry Areas (ICARDA), the Victorian Department of Primary Industries and the South Australian Research and Development Institute.

