

Hermitage Research Station

R.N. Amos, Technical Services Branch



Plate 1. Breeding sorghum in a glasshouse.

Introduction

Hermitage Research station has made many major contributions to commercial agriculture in south-east Queensland by improving varieties of the major crops grown in the region and evaluating new techniques in crop and animal production.

Established in 1897, when the large selections of the first European settlers were being subdivided for closer settlement, Hermitage is one of the oldest research stations in Queensland.

Situated six kilometres east of Warwick, Hermitage occupies 228 ha on the west bank of Swan Creek, a tributary

of the Condamine, on the eastern Darling Downs. The station carries out plant breeding as well as agronomic and animal studies relevant to commercial farming on the Darling Downs and adjacent regions, one of the most fertile and productive areas in Australia.

With an average annual rainfall of 725mm and a normal distribution of high summer rainfall with frequent storms, moderate spring rain, and relatively dry autumn and winter, the region is a major production area for winter and summer grain crops. Dairying is still important on the eastern Downs, and beef production (both free-range and feedlot) is a major

income earner. Pig raising, wool and prime lamb production, apiculture, and a developing cashmere industry are also suited to this diverse and rich agricultural region. Wide seasonal temperature variations are experienced at Hermitage, from a high of 38°C in January to a low of -4°C in July. Frequent frosts occur between late April and mid-October, and the grass temperature can sink to -10°C. This general pattern is common to the Downs and crop varieties and production techniques have to be tailored to suit the conditions.

History and development

Discovery and exploration of the Darling Downs by Allan Cunningham during 1827-28 led to settlement by graziers from the colony of New South Wales, initially by the Leslie brothers. They established 'Toolburra', the first sheep station in Queensland in 1840, and subsequently the historic 'Canning Downs' station near the present town of Warwick, which is celebrating 150 years of European settlement in Queensland next year.

Other squatters soon followed and selected large pastoral holdings, however from around 1870 these were resumed by the Government and subdivided for closer settlement. The State Farm, as it was then called, comprised part of Canning Downs Station and was established to provide information for farmers on these new subdivisions. During this early period a variety of experimental work was conducted on a wide range of crops and livestock enterprises.

During the Depression years, the State Farm was leased for commercial use but in 1946 the lease was terminated and the farm resumed operations, as a Regional Experiment Station with wheat breeding as a major activity. This work, initiated by the late R.E. Soutter who developed Queensland's early commercial varieties, was transferred to Hermitage under the guidance of David Rosser until the establishment of the Queensland Wheat Research Institute at Toowoomba in 1962.

Station staff in 1946 comprised the station manager, three technical officers and two farmhands. The number of

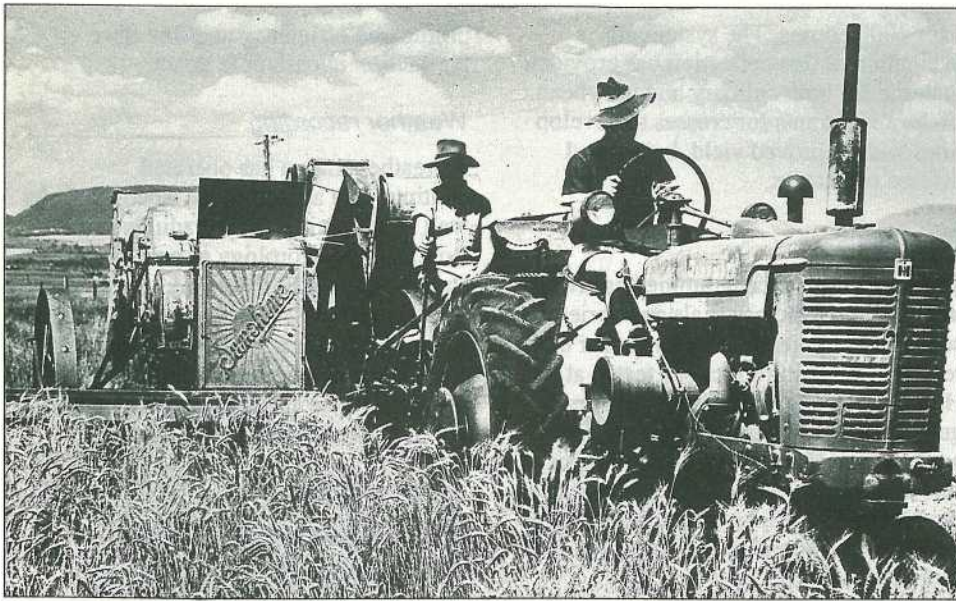


Plate 2. Harvesting wheat trial plots in 1955.

permanent staff at the station has now grown to 40; 11 graduate officers, 17 technicians, nine farm staff and three administrative personnel.

Initially trials were established with the smallest available seed combine or a range of hand planters. Harvesting was done with a commercial header which was impossible to thoroughly clean and resulted in considerable mixing of seed between plots. Nursery rows were harvested by hand.

From 1965 a range of hand planters and harvesting equipment became available, some commercially manufactured and others developed by station staff. This equipment made possible comparatively fast and accurate planting and harvest of trial plots and from about 1970 onwards this machinery was also transported to various properties in the region to replicate station trials, improving the accuracy and relevance of the results.

The steady improvement in specialised equipment for plot planting and harvesting, and in the transport units, has produced a dramatic expansion in the number and extent of off-station trials. This ability to plant trials with large numbers of entries at wide ranging sites throughout the region has greatly increased both the quantity and quality of data obtained from the research programme, and the advent of computers has facilitated the collation and analysis of this data. The result is an ability to

carry out thorough and reliable testing of very large numbers of trial entries over a wide range of representative sites.

Research programme

Plant breeding and testing has always been a major component of the research programme at Hermitage and the station has made many significant contributions to primary production by developing improved varieties of commercial crops.

Sorghum breeding

Sorghum breeding began in 1958 and concentrated on identifying superior hybrids from American parent material and marketing them through the seed certification scheme. Between 1962 and 1972, eight major commercial hybrids were released. More recently the breeders have concentrated on developing improved parental lines for release to the seed industry, allowing improved commercial hybrids to be provided. The 39 parental lines developed since 1972 have included varieties with resistance to sugarcane mosaic virus, smut and midge. These parents have been released for use by commercial seed producers and have produced many of the improved hybrid grain sorghums grown by Downs producers today. A late-maturing hybrid forage sorghum variety produced from Hermitage bred parents produces green feed over a much longer period.

Barley breeding

The barley breeding programme, established in 1973, has contributed to the rapid expansion of barley production in Queensland. The feed variety Corvette, released in 1973, was widely accepted; and Grimmer, a malting quality variety released in 1976 has become the main commercial variety in Queensland. A new malting variety with improved yield and disease resistance is currently undergoing major seed increase and will



Plate 3. Harvesting barley trial plots in 1989.

be available for planting by farmers in 1991.

Barley agronomy

Other aspects of the barley research programme include studies on planting much earlier than the traditional sowing time and investigations into the effect of climate and soil variability on the development of particular varieties. The programme is also studying growth patterns of barley varieties to prepare computer model predictions. These models will help growers select varieties and management practices.

Soybean breeding

Soybean breeding began at Hermitage in 1970 and the early work resulted in the release of locally-adapted high yielding American varieties. Subsequently eight new varieties have been released from Hermitage: Collee, Flegler, Canopolis, Nessen, Dragon, Centaur, Triton and Manark. The initial aim was to produce well-adapted, high yielding varieties with good height and resistance to lodging, shattering and leaf diseases. With the advent of phytophthora root rot in 1980, emphasis is now placed on producing varieties which are immune or resistant to this disease and results to date indicate a steady advance in yield increase as well as improvements in resistance to phytophthora, shattering and lodging.

Sunflower breeding

The development of a Queensland sunflower oilseed industry led to the establishment of a breeding programme at Hermitage in 1970, based mostly on high oil content Russian introductions. Since then germplasm has been introduced from South Africa, Argentina, Europe and America. The breeding programme has released germplasm resistant to present races of rust, with improved resistance to blight, and lines which are 10% higher in linoleic acid content and suitable for polyunsaturated oil and margarine.

Navybean breeding

Navybean breeding began in 1982 with final yield assessment of lines developed in the 1970s and the assembly of a germplasm collection which now totals

over 2000 entries. The systematic evaluation of this collection has provided material for both culinary and navybean trials, and parents for crosses to develop lines with improved yield, height and disease resistance.

New crops

The experimental programme has always included introductory trials and varietal screening of potential new crops for the region. Recent introductions tested at Hermitage include chickpea, sesame, guar, lupin, pigeonpea, fenugreek and amaranthus. Hermitage played a major role in assessing the potential of chickpea on the Darling Downs and its subsequent development as a significant commercial crop in the region.

Weed control

The weed control research programme conducted from Hermitage aims to minimise losses in cropping systems in the region. Major contributions include detailed investigations on the use of residual herbicides in conservation cropping systems and evaluation of herbicides for use in minor crops and for limited weed problems.

Pasture research

The station has participated in varietal assessment programmes for grasses and pasture legumes which provide information to help farmers select pasture mixtures. Since the early 1970s, Hermitage has conducted a major evaluation of annual medics as a winter grazing legume and a source of soil nitrogen, highlighting the value of legume-based pasture in cropping rotation.

Animal studies

The Hermitage research programme has always included an animal studies component. During the 1970s, the use of economic criteria for the selection of pig herd replacements was demonstrated, resulting in wide acceptance by the local industry, and a valuable store of data was compiled on the use of forage crops and supplements in feedlotting of cattle and sheep. More recently animal research has focussed on increasing prime lamb

production efficiency and fine fibre production in cashmere goats.

Weather recording

A weather station has operated continuously at Hermitage since 1946. As well as supplying daily readings to the Bureau of Meteorology as part of its statewide recording network, the climate data is useful to station research staff as it is a major factor affecting plant growth. Computers have greatly simplified and accelerated the collection, collation and analysis of experimental data.

Other activities

An experimental solar collector and rock heat-storage bank has demonstrated a potential use for cheaper glasshouse heating.

Extension and Industry liaison

Regular meetings of the Industry Consultative Committee, made up of senior research staff and representatives from the major primary industries in the region, ensures that the research programme remains relevant to industry needs.

Extension activities include field days, collaboration on varietal planting recommendations, talks to growers, show exhibits and a range of presentations on radio, television, and in rural press and scientific journals.

School groups visit the station to learn about agricultural research. Hermitage also helps train college and university students in plant breeding and testing.

Regular seminars at Hermitage feature speakers from station staff, as well as visiting Australian and overseas scientists.