

DEPARTMENT OF AGRICULTURE AND FISHERIES, SOUTH AUSTRALIA

Agronomy Branch Report

ANNUAL REPORT 1975 - 76



REPORT NO. 74

AGRONOMY BRANCH REPORT

for year ending June 30, 1976

EXECUTIVE OFFICERS

A.F. TIDEMAN	Chief Agronomist
J.D. McAULIFFE	Principal Agronomist
M.R. KRAUSE	Principal Research Officer
E.D. HIGGS	Senior Research Officer

COVER:

A high contrast print showing Crop Agronomy Officer Norm Steinborner harvesting an experimental crop of Clipper barley at Geranium.

CONTENTS

	Page
Foreword	4
Agricultural Conditions and Harvest Results	5
Agronomy Extension Section	7
Bushfire Protection Section	12
Crop Agronomy Section	16
Entomology Section	20
Pasture Utilisation Section	24
Plant Breeding Section	28
Plant Introduction Section	31
Plant Pathology Section	34
Seed Physiology Section	37
Seed Production Section	40
Weed Science Section	45
Appendix I - Publications	50
Appendix II - Extension Activities	53

FOREWORD

This year is the fiftieth anniversary of the appointment of the first district agricultural instructors, known today as "district agronomists". The account of the first five appointments occurred in the September 15 issue of the Journal of the Department of Agriculture, 1926.

Fifty years later our officers basically are doing the same job that was so clearly listed in that Journal for the agricultural instructors, — they are teaching agricultural technology, but of course with greater scope and backed by research workers and their many new sciences.

The twenty equivalent officers of today also have new horizons to face. Some have special national tasks serving on committees, such as those dealing with the standards of our agricultural produce to ensure their marketability overseas. Some have international responsibilities a long way from their districts where they are offering our agricultural technology to developing countries. In particular, two of our district agronomists have been working in Libya during the period of this report.

I believe the most interesting aspect of this year's report is the emphasis on new crops. Prominent among these are sunflowers, lupins and now triticale, a man-made crop, none of which were mentioned in reports of a few years ago. In addition, the increasing emphasis on biological control is an interesting highlight, together with the further strengthening of the Branch's regional operations.

Promotion of our State's agricultural products, while not a new task, has been given increasing emphasis and as a result, has brought its rewards. The campaign by the Seed Production Section, in association with the industry, to promote the production and marketing of medic seed has led to a 200 per cent increase in export sales this year. By way of contrast, other states have had a 50 to 70 per cent drop in production. This is one of a number of success stories.

Branch officers acknowledge with thanks the assistance received from members of other branches of the Department of Agriculture and Fisheries, the C.S.I.R.O., South Australian and Australian Government departments, private industry and commerce. In addition, the advice, encouragement and generous assistance of South Australian farmers in providing land and/or livestock for trials has contributed greatly to the work of the Agronomy Branch.

**A.F. Tideman
Chief Agronomist**

AGRICULTURAL CONDITIONS AND HARVEST RESULTS

January and February of 1975 were characterised by marked rainfall deficiencies in most of the agricultural areas of the State. Conditions were cool to warm and strong winds in January caused some damage to buildings and electrical installations in some areas. Bushfires in February, some from "burning off" operations, caused extensive property damage and loss of livestock feed for some growers, mainly in the Upper North and on Kangaroo Island. However, in general, the paddock feed situation was adequate for the high livestock numbers being carried on farms.

March remained relatively dry until late in the month when useful to excellent rains (10 mm to 80 mm) were recorded. Best rains were recorded in the Central and South East regions.

However, good follow-up rains did not occur in April causing farming operations to come to a halt throughout most of the State. Many newly germinated pastures died or were severely thinned out, and hand feeding of livestock was necessary.

Erratic rainfall in May, varying from well below to above average, allowed some crop sowings throughout the State, but to the end of the month only about 15 per cent of the State's total anticipated crop area had been sown. While the rains slightly improved the pasture situation, paddock feed was critically short. Hand feeding of livestock was heavy and fodder reserves dwindled.

Dry June: It was a dry, frosty June in which 19 recording districts recorded their lowest June rainfall on record, another 13 their equal lowest and 14, mainly in the Northern region, no rain at all. This created a serious situation for crop and particularly pasture production throughout most of the State. Exceptions were on the Lower Eyre Peninsula and in the Lower South East, where useful falls permitted operations to progress satisfactorily. By the end of the month about 55 per cent of the State's total anticipated crop area had been sown. Numerous frosts further checked paddock feed and, with heavy hand feeding and dwindling fodder reserves, severe livestock reductions began to take place.

Rains recorded early in July, boosted the area of sown crops allowing completion of sowings in all but the State's marginal areas. The Northern Mallee, in particular, suffered and only a small area was sown to crops. Paddock feed also was critically short in this area. Elsewhere, pastures were insufficient to maintain livestock numbers.

Light, below average rains in August further dampened growers' crop hopes. Apart from on Lower Eyre Peninsula and in the South East, there was an urgent need for soaking rains. While hand feeding of livestock had eased, paddock feed was still short and, with little conservation of fodder likely for reserves, summer fodder crops were being considered by many growers.

In September variable, but good rains fell throughout the State. Conditions brought about a much improved crop and pasture outlook in most agricultural areas of the State. Subsoil moisture was still limited. Paddock feed, although short, was adequate for maintaining livestock in most districts.

Dramatic Improvement: A dramatic improvement in the agricultural outlook for the State followed the heavy October rains. Total falls ranged from 41 mm to 223 mm and represented somewhere between 200 and 400 per cent above the average in most districts. The conditions were beneficial to crops and pastures which responded well. By the end of October a few wheat and barley crops had been reapt, mainly on Upper Eyre Peninsula. New green growth caused delays in harvesting programmes in most other areas. Paddock feed was now in excess of livestock demands and offered prospects of useful hay cuts in many areas.

Light rains in November, varying mainly from below average to average, together with a rather rapid change to summer-like conditions, did not favour crops with a good finish to the season. Wheat prospects had been significantly reduced due to diseases such as glume blotch and haydie, while barley prospects were not expected to be as good as previously forecast due to wind losses and widespread barley grub activities.

Harvesting was under way in most districts, but green growth in the sample was causing moisture problems and delivery delays to regional and terminal silos. Paddock feed was drying off but was in excess of livestock demands in most areas of the State.

Harvest: Light, patchy and below normal rains for December allowed the harvesting of cereal, oilseed and grain legume crops to continue throughout the State, and about 80 per cent of the harvest had been completed by the end of the month. Crop yields were surprisingly better than expected, particularly for cereals which were quite outstanding considering the setbacks during the season.

The harvest had been completed in all but some coastal and South East areas by the end of January and final crop estimates for the State (for grain) indicated the following:

Crop	Area (ha)	Production (tonnes)	Crop	Area (ha)	Production (tonnes)
Wheat	960,000	1,164,000	Lupins	17,030	22,039
Barley	851,000	1,098,000	Oilseed rape	4,100	7,262
Oats	131,000	135,000	Safflower	1,090	1,531
Rye	11,520	3,589	Sunflower	5,300	6,180
Field peas	15,480	18,206	Lentils	370	295
Linseed	1,850	2,510			

Pastures supplemented by crop stubbles provided adequate feed for livestock throughout the State. The dry conditions affected the production of some pasture seed crops, but some good yields had been reapt, particularly in medic, where seed production for the State was expected to be an all time record for Australia.

AGRONOMY EXTENSION SECTION

SECTION LEADER:

G.D. Webber, R.D.A., H.D.R.E., Senior Agronomist

EXTENSION OFFICERS:

Adelaide Office	S.G. Williams, R.D.A., Assistant Senior Agronomist N.R. Matz, Special Agronomist
Kangaroo Island	R.C. Hagerstrom, R.D.A., Senior District Agronomist (War Service Land Settlement)
Lower Eyre Peninsula	K.J. Holden, R.D.A., G.D.E., Senior District Agronomist
Eastern Eyre Peninsula	J. Cawthorne, R.D.A., R.D.A.T., District Agronomist
Upper Eyre Peninsula	T.R. Davidson, R.D.A., District Agronomist
Mid South East	P.J. Mowatt, R.D.A., G.D.E., Senior District Agronomist
Lower South East	P.L. Marrett, District Agronomist
Upper South East	T. Prance, R.D.A., R.D.A.T., District Agronomist
Murray Districts	K.G. Bicknell, D.D.A., (Seconded to overseas service, Libya), Senior District Agronomist N.M. Brooks, R.D.A., Acting District Agronomist
Northern Mallee	B.C. Bull, R.D.A., Acting District Agronomist
Southern Mallee	J.N. Hannay, R.D.A., R.D.A.T., District Agronomist
Lower North	W.A. Michelmore, R.D.A., Senior District Agronomist
Upper North	A.E. Hincks, R.D.A., (Study leave, New South Wales), District Agronomist Mr. R.S. Britton, H.D.A., (Temporarily transferred from Weeds Section), Acting District Agronomist
Yorke Peninsula	T.R. Dillon, R.D.A., (Seconded to overseas service, Libya), District Agronomist Mr. P.M.S. Potter, B.Ag.Sc., District Agronomist
Central District	Mr. P.D. Fairbrother, R.D.A., District Agronomist Mr. M.A. Schwerdt (retired February, 1976), Field Assistant

AGRONOMY EXTENSION SECTION

During the 1975-76 year the Agronomy Branch Extension Section has continued to provide extensive technical, advisory and education services to primary producers throughout South Australia through 14 regional districts. The demand for the wide range of services carried out by district agronomists continued at a very high level. In addition, the services to agricultural industries and other Government departments has further expanded.

The management of district operations of the Branch on a regional basis was assisted by the formal reclassification of four officers as Senior District Agronomists to supervise and co-ordinate activities in the four main regions of the State, viz:— Eyre Peninsula, Northern Region, Murray Mallee and South East.

In the absence of the Senior Agronomist (Weed Science) on study leave, the four regional weeds agronomists were integrated into the general agronomy field services management area. This enabled operations to be further co-ordinated with more integrated planning on a regional basis.

Widening Services: The effect of the widening range of services being supplied by the Department resulted in officers being allocated special duties, and in some cases redeployment of duties. Some of these special task allocations included the full time secondment of the Senior Agronomist for four months to lead a working party on information services and publications, part-time secondment for duties on a working party on public relations and part-time on a task force to produce a promotional book, "Farming Systems in South Australia". Other important special duties carried out by officers included the preparation of reports for Ministerial enquiries, reports on technical matters to other Government departments, attending to applications under the Rural Advances Guarantee Act, 1963, and assisting the South East Drainage Board. The Assistant Senior Agronomist is responsible for the co-ordination of assessments of subdivisions on behalf of the State Planning Office, and he arranged 87 inspections and reports during the year.

Educational tours and training programmes were conducted for farmer groups, agricultural students and a large number of overseas visitors.

Overseas Interest: Because of the interest in South Australian farming systems in various parts of the world, a number of overseas administrators and technologists again visited South Australia.

The Branch was closely involved in the programme organisation, briefing assignments and field inspections for these visitors from a range of organisations including a 10 member F.A.O. group from the Mediterranean and Near East regions, a representative of the World Bank, and official parties from Algeria, Spain, Uruguay, South Africa, Iran and Nigeria. An important part of the programme of promoting South Australian technology overseas carried out by this Branch, was the production of the book "Farming Systems in South Australia", and the technical arrangements for a film currently being produced.

Crop Monitoring: In response to the increasing demand from agricultural industries for up to date information on the production outlook for agronomic crops, efforts were made to further streamline the crop conditions monitoring system. Previously, crop estimates were given annually each October by district agronomists. The new system introduced this year involves the preparation and revision of estimates on a monthly basis throughout the year. These monthly reports are distributed to the media, commerce and industry. In addition, detailed crop estimates are requested on a regular basis by a large number of organisations associated with agricultural production. These include stock agents, grain marketing organisations, food processors, stock feed manufacturers, financial institutions and the Bureau of Statistics and Economics.

Registered Seed: A number of changes were made to the registered cereal seed growers scheme to further improve the quality of seed for distribution to growers.

These included the introduction of purity and germination tests, analysis reports and the branding of bags.

District officers carried out all inspections associated with 800 ha (16 growers) of wheat and 300 ha (10 growers) of barley. In addition, 11 growers grew approved Egret wheat seed for distribution to the soft wheat growing areas.

Trials: A number of demonstration trials were laid out by field agronomists in various parts of the State to complement extension programmes. These demonstrations included work with cereal and minor crops, pasture cultivars, techniques in establishment, weed and pest control and management factors associated with more efficient crop and pasture production.

Extension officers worked closely with Departmental and other research officers and had considerable contact and liaison with agricultural industry and commerce representatives. These activities have been important in providing efficient services to the rural community.

The Crop Industry Study Group continued to have an important role in the development of overall Branch policies in the agronomic crops area and developed further close associations with representatives of marketing boards, commercial firms and farmer organisations. These meetings have proved to be valuable in keeping the Branch informed on industry matters and in co-ordinating programmes across the Branch.

Extension Programmes

District extension programmes are continuing to be directed at a wide range of crop and pasture production activities, improving extension efficiency and investigational work on district problems.

The regional advisers' meetings held in each region three times a year are important in the development, co-ordination and evaluation of extension programmes.

Some of the more significant programmes conducted in 1975-76 are:—

New crops: The expansion in areas being sown to lupins and oilseed crops in recent years has called for considerable development work to assist these industries.

Programmes are centred on:—

- Lupins — investigation of the variety situation, rate of seeding, herbicides for efficient weed control and other cultural factors have been carried out with lupins in the South East and Lower Eyre Peninsula districts.
- The oilseed programme which has been associated mainly with collation of information on the cultural and management aspects of both dryland and irrigated sunflower production and the dissemination of this technology to growers in the South East region.

Cereal grain quality: In order to improve the quality of the State grain harvest, programmes are aimed at:—

- Promotion of recommended varieties and keeping growers informed on performance of newer varieties. Due to the severe stem rust situation in recent seasons, investigations have been conducted through district trials to assess the most suitable rust resistant varieties for rust prone areas.
- Stressing the importance of farm hygiene in the control of grain insect pests at farm level. A survey is being conducted as a follow up to the one conducted in 1972, to further critically assess the grain pest situation at farm level.
- Reducing contamination of grain samples by weed seeds and other impurities.

Pastures for cereal areas: Maintaining good legume pastures is of immense importance in the South Australian cereal zone. The main parts of the programme are:—

- A survey is being conducted to assess the current situation regarding legume pastures in the cereal areas.
- A co-operative programme of legume demonstrations in a number of areas is being carried out in conjunction with the seed industry.

- Medic evaluation trials are in progress to assess newer early cultivars for the marginal areas.

Pasture for higher rainfall areas: For many years Yarloop has been the most productive subterranean clover cultivar for waterlogged soils. The high oestrogen content of Yarloop has dramatically reduced the breeding capacity of ewes, resulting in considerable economic losses.

New low oestrogen cultivars, such as Trikkala, are now available. This programme is designed to test the suitability of the new cultivars in comparison with Yarloop in several of the higher rainfall areas of the State.

Attention is being focused on the improvement of pastures on the lower fertility sandy soils in the southern Hills area, specifically in relation to fertilisers, pasture species and management techniques.

Fertilisers on new varieties: The objective of this project is to assess the economics of nitrogen fertiliser applications to Clipper and Weeah barley on parts of southern Eyre Peninsula.

Weed control programmes: Programmes in progress are related to:—

- Restricting spread of yellow burr weed
- Soursob control.
- Control of grass weeds in cereal crops.

Annual ryegrass toxicity: This is a programme being carried out in the Northern areas to alert farmers to the problem and the importance of early recognition. Investigations are continuing with the assistance of local farmers.

Group action: A number of educational programmes are being developed with informal farmer groups. Several group problem-solving projects have been undertaken in the Lower South East at Mt. McIntyre, Glencoe and Eight Mile Creek and in other areas of the State. These have provided excellent opportunities to discuss district problems.

Agriculture in S.A. series: The Branch has produced a series of information bulletins detailing all facets of agricultural production in each district of the State. These bulletins currently are being up-dated and then will be reprinted for the third time.

Staff Movements and Activities

Appointments and transfers: Messrs. Bicknell and Dillon were away for the whole of the year on overseas duties at the demonstration farm at El Marj, Libya. Messrs. Brooks and Bull continued as Acting District Agronomists in place of these officers.

Mr. Cawthorne was appointed as District Agronomist for Eastern Eyre Peninsula with headquarters at Cleve.

Mr. Potter was transferred from the Eastern Eyre Peninsula district to Yorke Peninsula with headquarters at Kadina.

Mr. Britton was appointed Acting District Agronomist at Jamestown while Mr. Hincks is away on study leave.

Training, study leave, conferences: Mr. Holden returned to Pt. Lincoln from Hawkesbury (N.S.W.) after successfully completing the Graduate Diploma in Extension, and Mr. Cawthorne returned to Cleve following his successful completion of the R.D.A.T. course at Roseworthy Agricultural College.

Mr. Hincks is currently undertaking the G.D.E. course at Hawkesbury.

Messrs. Hannay, Brooks and Bull attended the in-service Communication II school.

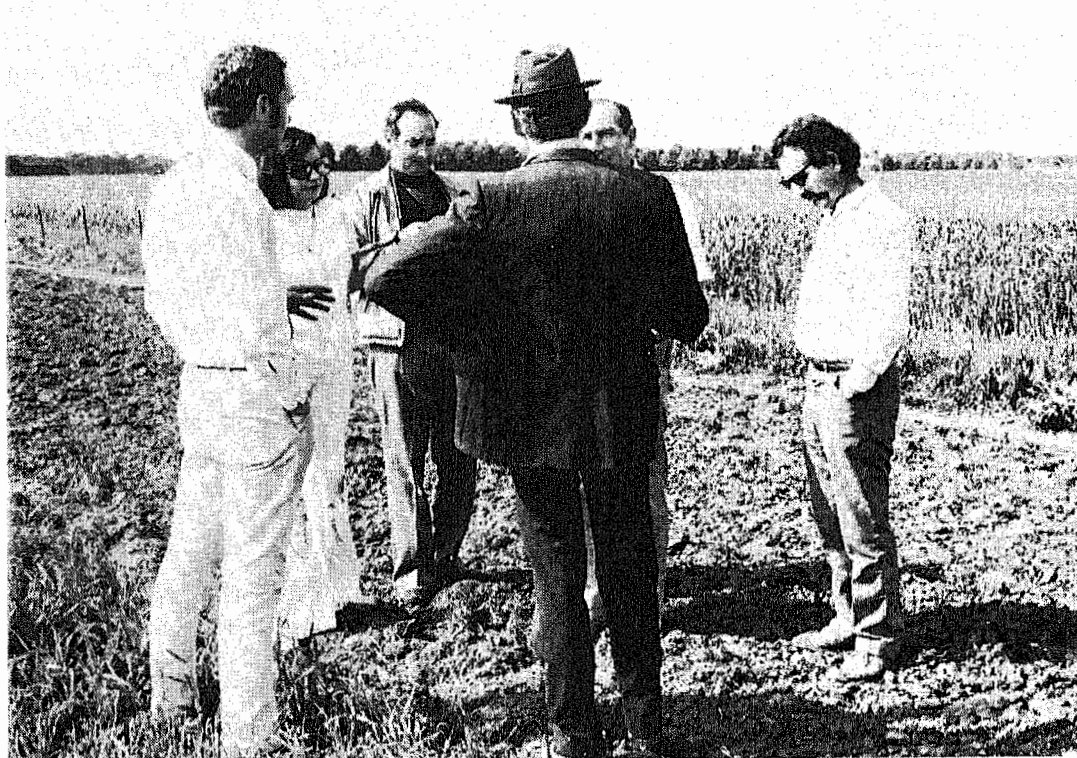
Mr. Hagerstrom attended the Extension Education Workshop at the University of Queensland in November, 1975.

Mr. Mowatt attended the Sunflower Conference in Griffith, New South Wales.

Messrs. McAuliffe and Williams attended the Australian Wheat Industry Review Conference in Sydney in March, 1976.

Judging: Extension officers of the Branch helped a number of Agricultural Bureaux with judging of bulk grain competitions and crop competitions.

Mr. Williams assisted as a judge in the Agricultural Produce Section of the Royal Show and Mr. Webber was a judge at the State finals of the Elanco Rural Youth award competition for young farmers.



Agronomy Extension Officer Trevor Dillon (left) with Algerian delegation led by Algerian Secretary General for Agriculture Mr. Boukli (centre left) visiting farm at Bute.

BUSHFIRE PROTECTION SECTION

SECTION LEADER:

B.J.T. Graham, R.D.A.

EXTENSION OFFICERS:

B.J. Francis
R.H.T. Freak
B.A. Green

FIELD ASSISTANT:

L.B. Hoff

SECRETARY, BUSHFIRE RESEARCH COMMITTEE:

J.M. Priest

BUSHFIRE PROTECTION SECTION

The programme of work being undertaken by the Bushfire Protection Section yielded some pleasing results during the year, and several new areas of investigation were commenced. Two of the research projects initiated some four years ago have been completed, and the results put into operation.

RESULTS. Following completion of the study into grass fuels, the Bureau of Meteorology requested the Section to provide a fuel-state reporting service on a State-wide basis. This service now provides the Bureau with a comprehensive and constant appreciation of the fire fuel situation in the 15 fire ban districts throughout the State.

Information resulting from the research project into fire safety aspects of domestic incinerators has now been adopted by the Australian Standards Association as Australian Standard 1875-1976 Domestic Incinerators (Fire Safety). Councils which impose local restrictions on the lighting of fires in the open but exempt approved incinerators, will now be able to use this standard as a basis for approval.

PUBLICITY. In the publicity and education field, very satisfactory results were obtained following a new approach to the four Adelaide television channels regarding production arrangements for the 30-second television films on bushfire prevention themes using their own personalities. In all, 17 new films plus revised copies of two films produced in 1974-75, comprised the programme for the 1975-76 summer publicity campaign.

The excellent coverage provided free of charge for this community service by all South Australian television channels is gratefully acknowledged.

EDUCATION ASSISTANCE. Following an approach to universities and Colleges of Advanced Education offering financial and resource assistance for approved bushfire research projects, four submissions were received and are now being considered for assistance. It is felt that this support will result in additional research being carried out over a wide range of disciplines.

Unfortunately no candidate has applied to take up the two-year post-graduate study into the costs of bushfires to the State, but it is intended to re-advertise the position in November, 1976.

Requests from seven district councils for the construction of fire access tracks were approved and a total of \$9,355 was reimbursed to the District Councils of Tatiara, Truro, Beachport, Mount Gambier, Elliston, Kingscote and the Mount Gambier Corporation.

The Australian Government, through the Natural Disasters Organisation, has offered financial assistance for the construction of fire breaks. The financial basis of the scheme requires that the total financial costs be met in the proportion of Australian Government 50 per cent, State Government 25 per cent, and Local Government 25 per cent.

The first project, requested by the District Council of East Torrens, has been submitted to the Natural Disasters Organisation for approval.

FIRE ASSESSMENT. A detailed damage assessment of the Elliston-Sheringa bushfire, which occurred over the period 10th-12th December, 1975, was carried out by Mr. Freak, Bushfire Adviser. The assessment revealed that the lightning-caused fire affected 19 properties, burned over 75,000 hectares of pastoral and bush country, and destroyed nearly 10,000 sheep and 800 km of fencing.

An appraisal of the progress being made in putting into effect the Monarto Bushfire Control Plan was carried out by Mr. Francis, Bushfire Adviser. His report indicated that except for some aspects, the plan had been put into operation by the Monarto Development Commission with great efficiency and a high regard for timing. Recommendations were made to implement the remaining fire protection measures on a priority basis.

A roadside vegetation study was undertaken in consultation with the District Council of Kingscote, the Highways Department, the Bushfire Research Committee and the Roadside Vegetation Committee.



Bushfire publicity in foyer of State Administration Centre, Victoria Square.

The study area selected involves about 50 km of roadside in the Hundred of Cassini which was burnt out in the Stokes Bay/Parndana bushfire on 6th February, 1975. The object of the study is to prepare and implement a comprehensive management plan for the control of bushfires, preservation of native vegetation, promotion of tourism, and provision of road user facilities. At the same time road safety standards, farm management requirements and the future needs of public utilities will be taken into account.

Conferences and Training Schools

- National Fire Prevention Publicity Conference, Hobart
- E.F.S. Regional Officers and Delegates
- E.F.S. Communications
- Eyre Peninsula Fire Fighting Association
- Eyre Peninsula Local Government Association
- Lower Eyre Peninsula Agricultural Bureau Conference
- Kangaroo Island Fire Fighting Association
- Murray Plains Agricultural Bureau Conference
- In-service Training — Communications II — L.B. Hoff
- Studying part-time Diploma of Arts (Journalism) — J.M. Priest
- E.F.S. Fire Control Officers School — R.H.T. Freak.

Current Research Projects

- Herbicidal control of unwanted vegetation
- Bushfire economics
- A study of arson cases.

Extension Projects

- Rural Youth community aid project
- Bushfire television films
- Radio spots
- Fire Prevention Week
- Bushfire prevention signs
- "Help Save Our State" campaign
- Fire Alert Day
- Smokey party programme
- Stereos for country newspapers.

Special Projects

- Fire access tracks
- District fuel breaks
- Monarto bushfire control plan
- Bushfire investigations – Elliston/Sheringa fire (10th-11th/12/75)
- Plastic fuel lines in vehicles
- Firebreaks in association with Natural Disaster Organisation
- Assistance to universities for approved research projects
- Fire safety with electric fencing
- Production of ABC Landline film "Lightning Triangle"
- Roadside management study – Kingscote District Council.

CROP AGRONOMY SECTION

SECTION LEADER:

T.G. Heard, B.Ag.Sc.

RESEARCH OFFICERS:

* M.J. Catt, B.Sc., Dip.Bus.Admin.

B.J. Marshall, B.Ag.Sc.

L. Nitschke, B.Ag.Sc.

** T.D. Potter, B.Ag.Sc.

TECHNICAL OFFICERS:

I.W. Magarey, R.D.A.

R.J. Puckridge, R.D.A.

Vacant

FIELD ASSISTANTS:

S.G. Cornish

M.R. Schubert

N.H. Steinborner

* D. McTernan

* Temporarily transferred from Weeds Branch.

** Transferred to Research Centres Branch, March, 1976.

CROP AGRONOMY SECTION

Regionalisation of Crop Agronomy Section activities was one of the major developments during 1975-76. This had been initiated 12 months earlier with the transfer of Mr. Cornish to Port Lincoln. Mr. Cornish has, in the past 12 months, continued his activities on behalf of the Crop Agronomy Section, but has additionally played an active part in programmes of other officers in the region.

REORGANISATION. In October, 1975 Mr. Potter, Research Officer (Crop Agronomy), was transferred from Adelaide to Struan as a further stage in regionalisation of the Section. He was joined there by Mr. McTernan, a Field Assistant, who had been appointed a short time previously. Moves were immediately initiated for the co-ordination of the work of Mr. Potter with that of Mr. Hawthorne, a Senior Research Officer stationed at Struan. Shortly afterwards a regional crop agronomy group headed by Mr. Hawthorne was set up to operate throughout the south east of the State. This group, consisting of four officers, will be engaged in all aspects of crop agronomy research in the area and will relieve the Adelaide based group of responsibilities south of Keith. The two officers originally in the Agronomy Branch have been transferred to Research Centres Branch to facilitate co-ordination. A technical link remains with Agronomy Branch.

The appointment of Mr. Nitschke to the position of Research Officer (Grain Legumes) will greatly strengthen the activities of the Section. Mr. Nitschke will be engaged in research related to all aspects of production of grain legumes with particular emphasis at this time on lupins, peas and beans. He also will control minor projects on oil seed crops in areas other than the south east of the State.

Mr. Puckridge has recently been transferred within the Section from Technical Officer (Wheat) to Technical Officer (Interstate Wheat Cultivar Trials). He will be responsible for the co-ordination of this programme which is conducted in all the mainland States. It is anticipated that his previous position will be filled in the near future.

Mr. Schubert was appointed to the position of Field Assistant within the Section in June, 1976. This followed the earlier resignation of Mr. Bourke from that position.

FIELD TRIALS. Following extensive field trials by the Crop Agronomy Section, two new cereal cultivars, Egret wheat and West oats, were added to the recommendations for 1976.

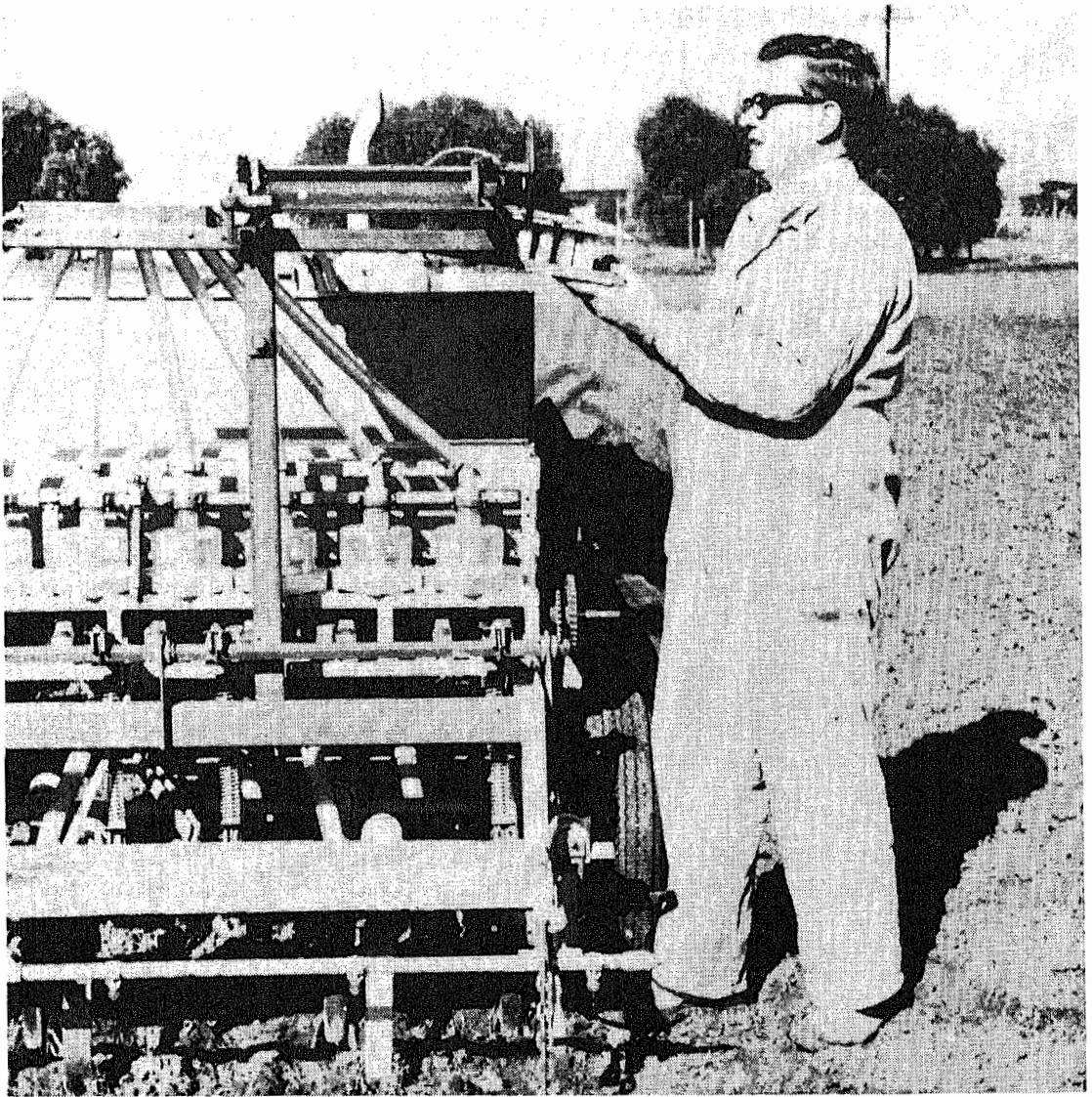
Egret has been recommended as a replacement for Pinnacle in areas where biscuit quality grain is likely to be produced. Over the period 1973-75 Egret outyielded Pinnacle by 75 per cent in trials. In two of these years stem rust, to which Egret has some resistance, severely reduced the yields of Pinnacle and many other cultivars. It is anticipated that even in the absence of rust, Egret will continue to outyield Pinnacle.

West oats also have some resistance to rust and this may in part account for the 26 per cent yield advantage exhibited over Swan in 1974 and 1975 trials. This cultivar is currently only recommended for trial sowings as some other aspects of its disease resistance apart from rust, are causing some concern.

Results of extensive trials carried out by the Section were used as supporting evidence in the registration of the wheat cultivar, Warimba, by the Waite Agricultural Research Institute. It is likely that this cultivar will be recommended in 1977.

A programme aimed at evaluating a range of triticale (wheat-rye cross) lines was initiated in 1975-76. Over 100 lines received in the previous year were built up in that season and trials initiated in 1975. Results of trials at Northfield and Perponda proved very promising with yields equivalent to those of other cereals. Considering the relatively short period during which this genus has been bred, it is anticipated that with further breeding, selection and evaluation, triticale could prove an extremely important crop in many areas of the world in the future.

SUNFLOWERS. Trials with sunflowers in the south east of the State have indicated the high potential yields possible under irrigation. Seed yields well in excess of 3.5 tonnes/hectare have been obtained with commercially available material.



Terry Heard (Senior Research Officer, Crop Agronomy) loading a magazine into a specially built cone seeder used for sowing experimental plots.

SERVICES. The extension bulletin "Better Care in Harvesting Malting Barley", written by Mr. Marshall was circulated very widely. The Australian Barley Board arranged for the printing of an additional 14,000 copies and distributed these to all barley growers in South Australia and Victoria.

The barley cultivar identification service being provided within the Section is developing. Both farmers and seed merchants are making increasing use of the service. Many of the samples submitted have contained large percentages of admixture and several have been considered quite unsuitable as seed.

WEED CONTROL. Trials conducted showed the effectiveness of difenzoquat (Avenge-Cyanamid) for control of wild oats in wheat and barley. This product is now registered in South Australia and provides the first post-emergent wild oat herbicide that can be used on Clipper barley. A new herbicide, HOE 23408 (Hoegrass-Hoechst), is showing considerable promise for the post-emergent control of annual ryegrass and wild oats in wheat and barley.

Trials conducted in the South East region indicated that two as yet unregistered herbicides, dinitramine (Cobex-ICI) and penoxalin (Stomp-Cyanamid), gave excellent control of several grass and broad-leaved weeds. Sunflower yield increases of 37 and 45 per cent respectively over the untreated controls were recorded. Both Trifluralin (Treflan-Elanco) and EPTC (Eptan-ICI) also gave yield increases of 15 per cent.

Trials in several areas of the State confirmed the effectiveness of simazine and trifluralin as herbicides for use in lupins.

Conferences, Training Schools

- Agronomy Branch Mini-conference on Seed Quality and Production in Cereals and Other Crops and the Barley Improvement Technical Committee Spring Seminar – B.J. Marshall, joint convenor.
- Australian Wheat Industry Review Conference, Sydney, March, 1976 – T.G. Heard as member of the Organising Committee.
- In-service Training School, Roseworthy College, February, 1976 – N.H. Steinborner.
- Australian Weeds Conference, Melbourne, March, 1976 – M.J. Catt.
- Observer of Spray-Seed use in Western Australia for 4 days in August, 1975 as guest of I.C.I. Australia Ltd. – M.J. Catt.
- Study tour during May-June, 1976 investigating aerial and ground applications of herbicides for weed control in field crops in the United Kingdom, U.S.A. and Canada – M.J. Catt.
- Sunflower Workshop, Griffith, N.S.W., March, 1976 – T.D. Potter.

Research Projects

- Wheat crossbred evaluation in primary trials
- Wheat cultivar evaluation in secondary trials
- Interstate wheat cultivar evaluation trials
- Barley crossbred evaluation in primary trials
- Barley cultivar evaluation in secondary trials
- Time of seeding of Clipper and Ketch barley
- Barley grain yield response to nitrogen fertiliser
- Oat cultivar evaluation trials
- Triticale evaluation trials
- Grain legume evaluation trials
- Control of annual grasses in cereals
- Weed control in lupins
- Weed control in sunflowers
- Sunflower cultivar trials
- Sunflower row spacing x population density trials.

ENTOMOLOGY SECTION

SECTION LEADER:

P.R. Birks, M.Ag.Sc.

RESEARCH OFFICERS:

P.G. Allen, M.Ag.Sc.

D.C. Hopkins, M.Ag.Sc.

D.E. Swincer, M.Ag.Sc. (Hons.)

TECHNICAL OFFICERS:

R.B. Jenkins

C. Phillips, R.D.A.

TECHNICAL ASSISTANTS:

G.S. Dearman

K.R. Henry

ENTOMOLOGY SECTION

Another outbreak of barley grubs occurred in 1975-76, the second year in succession. Eyre Peninsula was not seriously affected, but the intensity of attack increased from Yorke Peninsula to Kangaroo Island, the Lower North, Adelaide Hills and in the South East.

Following large catches in the Turretfield light trap, barley grub warnings were issued and growers were advised of the need to detect and treat infestations early to avoid poor spray results. All South Australian based aerial spray operators and nearly all growers co-operated fully in avoiding the use of DDT. Pesticide analysis on export grain samples have subsequently shown South Australian samples to be significantly better than samples from other States.

DDT ALTERNATIVES. The acceptance of alternative pesticides to DDT has been slow because of increased cost, some unsatisfactory results (mainly in the Lower North) due to unforeseen limitations with the alternatives, and absence of clear instruction from the industry to avoid the use of DDT.

Therefore a concerted research effort was made to develop a more satisfactory alternative. Following small trials, extensive testing on a commercial basis covering over 500 ha in 11 different heavily infested crops, indicated that chlorpyrifos, applied at 350-450 g/ha would give a more reliable alternative at a reasonable cost, and with acceptable residues and adequate availability.

A sampling and traceback programme has been undertaken in conjunction with the Australian Barley Board to help change the few growers who have still persisted with the use of DDT.

SITONA. Whereas barley grub and pea weevil numbers were high, sitona weevil numbers were low. Two years with successive late autumn rains have reduced numbers to their lowest for many years. The egg sampling technique has been streamlined and sampling showed that there were about one-third of the number of eggs present in 1975 compared with the previous year. Larval populations were about one-twentieth and adults about one-sixteenth of the 1974 levels.

The large fluctuations in sitona numbers from year to year reflect the operations of key factors in determining populations, and they need to be measured and understood before parasites are introduced. It would be easy to attribute the decline in numbers to a newly released parasite or to consider a parasite introduction a failure if it occurred just when sitona numbers were increasing. The first parasite release will be *Patasson lameerei*, the egg parasite, and this will occur before the end of spring 1976.

COCKCHAFER. With exceptionally good autumn and early winter growth of pastures at Mount Gambier in 1975, we found that 400 pasture cockchafer larvae per square metre neither reduced available pasture dry matter during the winter and spring, nor affected livestock production when continuously grazed at the rates of 16 and 32 weaners per hectare.

In 1976, a similar trial with extremely poor autumn and early winter growing conditions has been established at Flaxley. By measuring the significance of various larval densities under a range of growing conditions, economic injury levels will be established. When combined with efficient sampling methods, it will become possible to rationalise decision making, especially with regards the use of pesticides.

DUNG BEETLE. A total of 1,500 adults of the dung beetle, *Onthophagus taurus*, were released at Strathalbyn, Stokes Bay (Kangaroo Island) and Inman Valley during the spring of 1975. This dung beetle originates from Morocco and is the first species to be released in southern Australia that has evolved in a Mediterranean climate. Establishment will be assessed in the spring of 1976. Earlier releases have apparently failed to establish here.

Chlorpyrifos cereal seed dressing, developed for cereal curculio control, was evaluated and found effective in commercial crops against cereal curculio and wireworms. The rate could be increased from 40-60 g/100 kg of seed to cope with the heaviest cereal curculio infestations. The increase would be economic and non-phytotoxic.

FARM STORED GRAIN. A survey of farms examined in 1972-73 for insect pests of stored grain is not complete, but indicates a major change in the incidence of resistance to maldison. Whereas only one sample from 91 farms was resistant in the original survey, we have found 19 resistant strains out of 37 samples of *Tribolium castaneum* (51 per cent), 4 resistant strains out of 23 samples of *Sitophilus granarius* (17 per cent), 3 resistant strains out of 10 samples of *Rhizopertha dominica* (30 per cent). All resistant samples have shown maldison specific resistance. Dichlorvos remains effective against all strains.

So far there is no increased incidence of insects on farms, and no improvement in preventative measures. There is little or no detectable improvement in cleanliness of machinery and storage areas. The failure to effect any marked improvement is attributed to the lack of any incentive for farmers to change their present work habits. The increased incidence of resistant strains on farms will probably take a further two years to significantly affect feed and seed storages of many farms.

LOCUSTS. Plague locusts invaded the agricultural areas of Eyre Peninsula and the most northern parts of the northern agricultural areas during mid- and late February, 1976. Incoming flights were recorded on 17th February at Wudinna and 23rd February at Bruce.

During March significant locust numbers were recorded at Nundroo, Watraba, Ceduna, Nunjikompita, Wirrulla, Minnipa, Koongawa, Pinkawillinie, Buckleboo and in the Hundred of Wilcherry on Eyre Peninsula, and at Port Augusta, Quorn, Bruce, Cradock, Hawker, Belton, Orroroo, Baroota, Wandearah and Port Broughton in the north. During April, light numbers of locusts drifted into Lower Eyre Peninsula, especially on the strong north winds of 15th April.

Invasion and egg laying appears to be on a scale similar to the 1972 and 1973 outbreaks, and significantly less than occurred in 1974. Arrangements have been made to assist landowners with locust control through their district councils in the coming spring.

SNAILS. Terrestrial snails have become more numerous because of a succession of years with late spring rains. *Theba pisana* appears to be spreading extensively on Yorke Peninsula, replacing both *Helicella virgata* and *H. neglecta*. The large conical snail, *Cochlicella acuta*, confined to southern Yorke Peninsula has increased to plague numbers and has added to harvest problems caused by snails because it passes readily through header screens and contaminates the final produce. No better molluscides than the expensive methiocarb are available at present.

Conferences, Training Schools and Study Leave

Training

- Stored Products Pest Workshop, June, 1976 – P.R. Birks.
- Communications I In-service Training School, February, 1976 – D.C. Hopkins.
- Parasite Handling and Quarantine Procedures Study, Canberra, February, 1976 – D.C. Hopkins.
- Australian Encephalitis Vector Control Course, Mildura, December, 1975 – P.G. Allen.
- Specialist Conference in Soil Biology, Adelaide, August, 1975 – P.G. Allen.
- In-service Training Refereeing School, Ellen Bennett – P.G. Allen.
- Science Technician Certificate Course – K.R. Henry.
- Science Technician Certificate Course – G.S. Dearman.
- "Research into the assessment of damage caused by *Aphodius tasmaniae* in pastures" thesis for M.Ag.Sc. degree – P.G. Allen.

Committees

- 7th Entomology Committee of Standing Committee on Agriculture, Darwin, September, 1975 – P.R. Birks.
- Stored Products Sub-committee and Pesticides Resistance Sub-committee of Entomology Committee, Canberra, July, 1975 and a second Stored Products Sub-committee, June, 1976 – P.R. Birks.
- Grain Hygiene Committee, two meetings – P.R. Birks, J.D. McAuliffe and B.J. Marshall.
- South East Regional Research Committee, October, 1975 – P.R. Birks.
- South Australian Advisory Committee on Australian Encephalitis and Torrens Island Mosquito Control Committee meetings – P.G. Allen.

Major Research Projects

- Damage Assessment of Pasture Cockchafer (*Aphodius tasmaniae*) in Pasture. P.G. Allen, K.R. Henry.
- Release of Introduced Dung Beetles in South Australia. P.G. Allen, K.R. Henry.
- Insect Pests of Germinating Cereal Crops. P.G. Allen, K.R. Henry.
- The Biology and Ecology of Sitona Weevil. D.C. Hopkins, G.S. Dearman.
- Multiplication, Release and Evaluation of Parasites of Sitona Weevil. D.C. Hopkins, G.S. Dearman.
- Pesticide Residue Investigations
 - Barley Grub Control. D.E. Swincer, P.R. Birks, R.B. Jenkins.
 - Heliothis punctigera* control. D.E. Swincer, R.B. Jenkins.
 - Control of cutworms of the genus *Agrostis*. D.E. Swincer, R.B. Jenkins.
 - Evaluation of pesticides against pea weevil. D.E. Swincer, R.B. Jenkins.
 - Control of Rutherglen bug in sunflowers. D.E. Swincer, P.R. Birks.
 - Seasonal flight activity of cutworm species. D.E. Swincer, R.B. Jenkins.
- The Incidence of Stored Product Pests on Farms and Their Resistance to Insecticides. P.R. Birks, C. Phillips.

Extension Projects

- Survey and Control of Australian Plague Locust. P.R. Birks, C. Phillips, D.W. Swincer.

PASTURE UTILISATION SECTION

SECTION LEADER:

P.S. Cocks, M.Ag.Sc., Ph.D.

SENIOR RESEARCH OFFICERS:

P.R. Gibson, B.Ag.Sc.

*P.M. Kloot, M.Ag.Sc.

M.V. Smith, M.Ag.Sc., M.Ec.

FIELD ASSISTANTS:

J.R. Phillips

D. Carter

*Temporarily transferred from Weeds Section.

PASTURE UTILISATION SECTION

The Pasture Utilisation Section was active in a number of fields during 1975-76. Foremost among these were the involvement in the publication of a booklet, "Farming Systems in South Australia", progress in a survey on the use of annual legumes, measurement of the superiority of tall fescue in providing summer feed, and the discovery of two new annual grasses volunteering in pastures.

LEGUME SURVEY. Central to agriculture in South Australia is the use of annual legumes. During the year farmers in the Hundred of Dalkey (districts near Owen) were surveyed to determine their attitudes to the use of legumes. They were asked questions regarding their opinion of legume productivity, problems faced in establishment, what currently available cultivars are satisfactory, the main weed and insect problems and fertiliser usage. The survey has shown that 40-50 per cent of the Dalkey farmers have either not realised that investment in legumes is profitable, or, while realising the profitability of using legumes, face technical problems in their use. The survey will be expanded to areas in the Mallee, and on Yorke Peninsulas during 1976-77.

GRASS TRIALS. Measurements of sheep production from three perennial grasses sown at Mt. Alma, near Inman Valley, have shown that one of the grasses (Demeter tall fescue) has produced more wool over a whole year and heavier sheep during summer than the other two grasses (Mt. Alma perennial ryegrass and Siro hybrid *Phalaris*). Indeed, to the year ending 1st October, 1975, sheep grazing Demeter fescue produced 0.5 kg more wool per head than sheep grazing hybrid *Phalaris*, which, at 14 sheep per ha, is equivalent to 7 kg of extra wool per ha. This experiment is continuing.

WOOL CONTAMINATION. The use of medic and annual grass pastures, results in a utilisation problem which has not been studied previously — the contamination of wool by the seeds of these species. Wool samples were collected from each of the Adelaide wool sales during 1975-76, and the plant species present are being determined. Eventually it is hoped that a vast amount of ecological and geographical data on the plants will become available, together with a better understanding of the wool and its relationship with the plants. An early result, however, has been the discovery of two volunteer grasses previously unrecorded in South Australia. One of these species, *Vulpia membranacea*, is widespread in the southern Mallee and Upper South East where it appears to be the main silver grass contaminating wool. The other, *Bromus danthoniae*, appears to be rare on Yorke Peninsula and Kangaroo Island.

PASTURE WEEDS. During September, 1975 the Senior Research Officer (Weeds), Mr. P.M. Kloot, was seconded from the Weeds Section to the Pasture Utilisation Section. This move enabled another facet of pasture management to be undertaken, namely, weed control. One of Mr. Kloot's responsibilities has been the clearance, registration and approval of new herbicides. During the year, 11 submissions from the Commonwealth Technical Committee on Agricultural Chemicals were reviewed and 121 applications for the registration of new chemicals or amendments to existing labels were received. The amended labels are generally of a higher standard than previously, offering more information and, consequently, a greater degree of protection to consumers and the environment.

In addition, Mr. Kloot has played a major role in the up-grading of the Weed Control Certificate Course. The new course complements the recent weeds legislation, up-dates technical information, places greater emphasis on vegetation management and includes aspects of weed control in National Parks.

Major Research Projects

- The competitive ability, yield and seasonal fixation of nitrogen of three cultivars of subterranean clover — W.G. Wooton and P.S. Cocks.
- Evaluation of five pasture types in terms of liveweight changes and wool production — P.R. Gibson.
- Evaluation of perennial grass cultivars under grazing — P.R. Gibson.
- Survey of annual legume adoption in mixed farming areas — M.V. Smith.

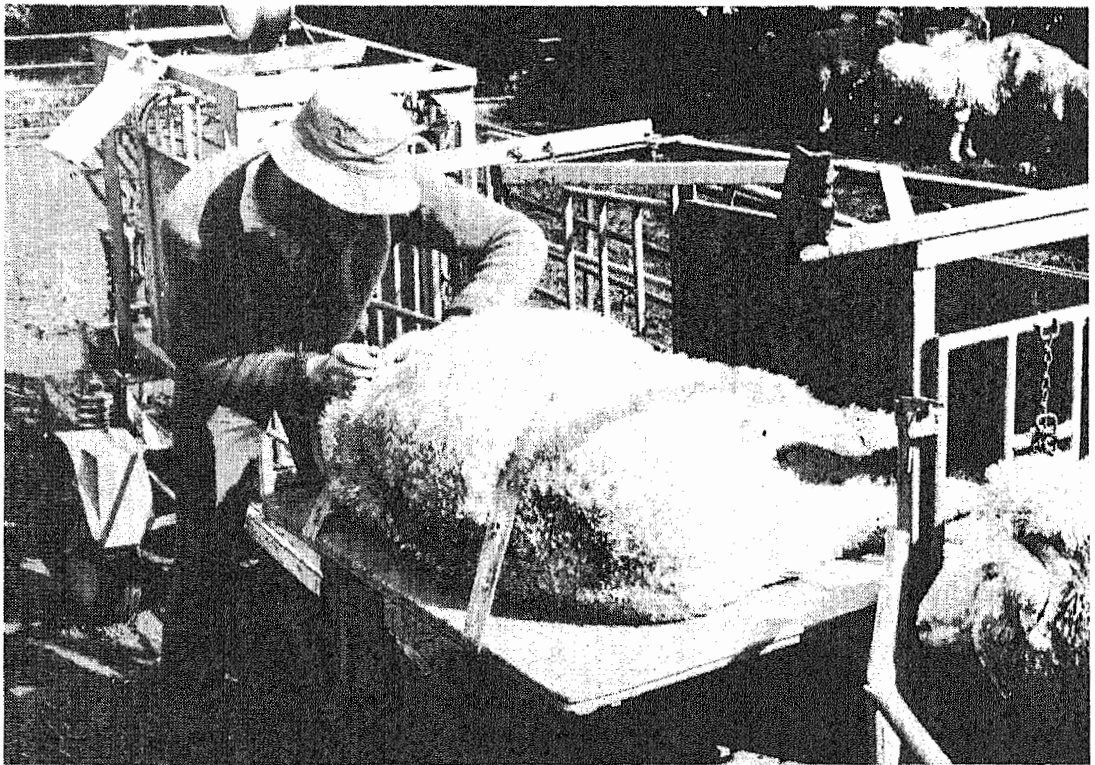


Dyebands showing seasonal wool growth.

- The inhibition of medic germination caused by wireweed – P.M. Kloot and K.G. Boyce.
- Vegetable fault in wool – P.S. Cocks.

Conferences, Training Schools and Study Leave

- Symposium on Plant Relations in Pastures at the University of Queensland – P.S. Cocks.
- Conference of the Australian Society of Animal Production, Adelaide – P.R. Gibson and M.V. Smith.
- The Australian Weeds Conference, 1976, Melbourne – (Mr. P.M. Kloot was the South Australian representative on the Organising Committee).
- Communications I Course at Roseworthy – J.R. Phillips.
- Communications II Course, Adelaide – D. Carter.
- Local Government Authorised Officers' Conference, Adelaide – P.M. Kloot and D. Carter.



Field Assistant David Murray dyebanding a sheep.