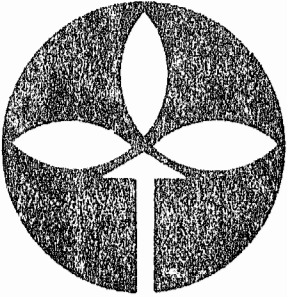


Report 49 part 1: beginning -  
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DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

# Agronomy Branch Report

AGRONOMY BRANCH ANNUAL REPORT

1972 - 73

Report No. 49.

SOUTH AUSTRALIAN DEPARTMENT OF AGRICULTURE

AGRONOMY BRANCH ANNUAL REPORT,

1972-73

Report No. 49

- CONTENTS -

	<u>Page</u>
FOREWORD:	
INTRODUCTION:	1
AGRONOMY ADVISORY SECTION:	5
BUSHFIRE PROTECTION SECTION:	17
CROP AGRONOMY SECTION:	28
ENTOMOLOGY SECTION:	38
PASTURE UTILISATION SECTION:	48
PLANT BREEDING SECTION:	54
PLANT INTRODUCTION SECTION:	62
PLANT PATHOLOGY SECTION:	71
SEED PHYSIOLOGY SECTION:	79
SEED PRODUCTION SECTION:	84
WEED SCIENCE SECTION:	92

APPENDIX

1. Seasonal Report & Production Trends	106
2. Crop Industries Study Group Report	109

- FOREWORD -

This report is the work of the Agronomy Branch of the South Australian Department of Agriculture for the year ending June 30th, 1973.

The staff gratefully acknowledges the valuable help that the Branch has received during the year from the Executive and other branches within the Department. The Waite Agricultural Research Institute, the C.S.I.R.O. and other Government departments have also greatly assisted us.

We have aimed during the year to work more closely with farmer organisations and also with many primary and secondary organisations. We are grateful for their response and the way they have helped our work in so many ways.

We also wish to thank the many landowners who freely gave of their experience and time to assist our projects.

<u>Chief Agronomist:</u>	A.F. Tideman
<u>Principal Officers:</u>	M.R. Krause J.D. McAuliffe E.D. Higgs
<u>Section Leaders:</u>	G.B. Baldwin P.R. Birks K.G. Boyce P.S. Cocks E.J. Crawford A.J. Dube B.T.J. Graham T.G. Heard M.J. Mathison D.C. Ragless G.D. Webber

INTRODUCTION

The Agronomy Branch of the Department of Agriculture last year consolidated operations which were newly defined and reported in the 1971-72 Annual Report. Gaps in the staffing, particularly in the Agronomy Extension and Crop Agronomy Research Sections, have delayed some important aspects of the new planning. The uncertainty of the future location of the Department has also created unwelcome difficulties within the Branch.

During August, 1972, Mr. M.R. Krause was appointed Principal Research Officer for the Branch. He brings to this position over twenty years of research experience in plant breeding and many other aspects of practical agriculture, and already his leadership has put new direction into many areas of our research work. Many background research projects, such as those involved in the safe and efficient use of agricultural chemicals as reported in previous years, have continued and further progress made during this year has been outlined in detail in this report. However, attention should be drawn to the emphasis now being given to aspects of pasture utilisation research, the pasture plant breeding programme and the new range of projects designed to improve the diversity and efficiency of the pasture and fodder seed production industry. To facilitate this work three new sections have been created in the Branch, namely the Pasture Utilisation Section led by Dr. Cocks, the Seed Physiology Section led by Dr. Boyce and the Plant Breeding Section led by Mr. Mathison. The Plant Introduction Section led by Mr. Crawford has also been more clearly defined and its work broadened.

It was planned to expand the activities of the Crop Agronomy Section to deal with urgent research problems associated with the production of oil seeds, lupins, field peas and other crops. However, as previously mentioned, the Branch was unable to appoint the necessary technical staff, although the finance was available, consequently our plans could not proceed. In the meantime, the Crop Agronomy Section has streamlined its field operations associated with the variety and hybrid testing of cereals by re-organisation of field staff duties and the introduction of more sophisticated equipment. It is hoped that this will give more time to turn attention to the alternate crops.

During the year the Branch has operated twelve agronomy extension districts under the guidance of the newly appointed Principal Agronomist, Mr. McAuliffe and the newly appointed Senior Agronomist, Mr. Webber. The Branch has also introduced a new specialist adviser to assist the State in the provision of farm management and other technical services to soldier settlers on Kangaroo Island. Regionalised administration of these services has been further developed. In the South East this development will be greatly enhanced when the Struan Centre becomes fully operational with a senior district agronomist working from there. During January, 1973, the agronomist assigned to that position was sent to the Hawkesbury Agricultural College to undertake a year of post-graduate studies.

Planned extension programmes in the Agronomy Branch have now operated for two years and valuable assessment of a number of them carried out. Throughout the agricultural areas during 1972-73, sixty planned extension objectives have been formulated and tackled by the fourteen field agronomists. The most important of these have been the programmes aimed at grain pest control, the control of 2,4-D off-target damage to vines, the promotion of product quality, particularly in cereal grain, and the integration of farm management advice.

The agronomy advisory services from Head Office have been taxed beyond capacity during the year because of staff vacancies and the ever increasing number of special tasks required to advise the Government and other organisations, and the many day-by-day enquiries received from farmers and the general public. The Branch has now accepted the responsibility of co-ordinating the Department's technical assistance to the State Planning Authority. Currently this involves inspecting and reporting on the viability of an average three proposed subdivisions throughout the State each week.

The general servicing of community needs through other Government departments is now an important role of the Branch and this aspect of our work will continue to grow. For example, besides giving technical services to the State Planning Authority as mentioned above, officers have been involved in one hundred hours of lectures at adult classes organised by the Department of Further Education. During this year members of the Branch also devoted more than 1,000 man days of work to local government authorities for technical assistance associated with weed control, insect control and fire protection. Our technical officers have also worked closely with the Lands Department on many projects involving drought relief, irrigation and drainage and with the Premier's Department in relation to various industrial developments associated with primary production. New

links have been established with the Department of the Environment and Conservation and with the Community Welfare Department.

During the year under review, the Branch has taken significant steps to work more closely with the executives of primary industries and associated organisations. This has been achieved quickly and very successfully by the formation of the Crop Industries Study Group comprising Messrs. J.D. McAuliffe, M.R. Krause, T.G. Heard and G.D. Webber, who have been meeting regularly with officials of the Wheat and Barley Boards to keep them informed of our research and extension programmes and to bring back to the Department and the Branch new developments for us to research and advise. These studies have also extended to the oil seed rape, lupins and field pea industries.

Mr. Ragless, towards the end of 1972, completed a most successful mission, mainly in the Mediterranean region, where he gave technical support for our pasture seed industry by attending an important trade fair and by contacting officials in many governments to explain how our pasture seeds could be used. Very significant sales have recently been finalised by the industry in these areas and it is believed that this has been successful largely because of our joint efforts.

Our international role, particularly in relation to the development of farming systems involving annual medic pastures, has continued to expand. During the year we trained a Tunisian pasture agronomist for ten weeks, and an Ethiopian agronomist for seven weeks. Nine other technical people from other countries called and stayed usually for several days, to examine various aspects of our technical developments.

Mr. E.D. Higgs was invited by FAO to attend a specialist meeting in Rome during November, 1972 to help developing countries define programmes for seed production. As only ten experts were chosen from around the world, this must surely be a measure of the high standard Mr. Higgs has achieved in his field.

Normal routine regulation services have been maintained by the Branch to help keep our agricultural commodities free of contaminants, particularly in respect to our export markets. During this year the effectiveness of the Weeds Act and the Seeds Act were reviewed at the direction of the Minister of Agriculture. As a result two new Bills have been drafted.

Finally, it is pleasing to report that it has been possible to maintain a high level of in-service training as well as formal post-graduate studies. As mentioned above, one officer is at present on study leave completing the Hawkesbury Diploma

of Rural Extension while another is at the Armidale University completing a Masters degree in Agricultural Economics. During the year Dr. Boyce successfully completed his Ph.D. at Corvallis, Oregon. There are seven research officers undergoing studies for higher degrees and at least a third of the Branch members have had an opportunity to attend either in-service training schools or have been granted periods of study leave for special courses and conferences designed to keep them abreast of developments in their technical fields.



AGRONOMY ADVISORY SECTION

PRINCIPAL AGRONOMIST: Mr. J.D. McAuliffe, R.D.A.

SECTION LEADER:

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

ADVISORY OFFICERS:

- |                        |  |
|------------------------|--|
| Adelaide Office        | - Mr. A.G. Williams, R.D.A., Acting Assistant Senior Agronomist                        |
|                        | - Vacant - Special Agronomist  |
| Kangaroo Island        | - Mr. R.C. Hagerstrom, R.D.A. - Senior District Agronomist (War Service Land Settlers) |
| Central District       | - Mr. P.D. Fairbrother, R.D.A., District Agronomist                                    |
|                        | - Mr. M.A. Schwerdt, Field Assistant   |
| Lower North            | - Mr. W.A. Michelmore, R.D.A., District Agronomist                                     |
| Murray Districts       | - Mr. K.G. Bicknell, D.D.A., District Agronomist                                       |
| Northern Mallee        | - Mr. D.M. Crawford, R.D.A.T., District Agronomist                                     |
| Southern Mallee        | - Mr. T.J. Dillon, R.D.A., District Agronomist   |
| Yorke Peninsula        | - Mr. N.R. Matz, R.D.A., District Agronomist   |
| Upper North            | - Mr. A.E. Hincks, R.D.A., District Agronomist   |
| Lower South East       | - Mr. P.L. Marrett, District Agronomist  |
| Upper South East       | - Vacant   |
| Lower Eyre Peninsula   | - Mr. K.J. Holden, R.D.A., District Agronomist   |
| Eastern Eyre Peninsula | - Mr. P.M.S. Potter, B.Ag.Sc., District Agronomist                                     |
| Upper Eyre Peninsula   | - Mr. T.R. Davidson, R.D.A., District Agronomist                                       |
| Mid South East         | - Mr. P.J. Mowatt, R.D.A., District Agronomist (Study Leave)                           |

AGRONOMY ADVISORY SECTION

1. SECTION ACTIVITIES:

During the year under review, the Agronomy Extension Section has continued to provide an advisory and education service to landowners through twelve regional districts. These services have also extended to industry, other Government departments, local government authorities and members of the public.

A very important departure from normal agronomy appointments was made to specifically service the War Service Land Development Scheme on Kangaroo Island. Mr. Hagerstrom took up duties based at Kingscote to provide an integrated farm management advisory service to these landowners in conjunction with the Lands Department. This is a reflection of one of the changing roles of the Branch.

Seven changes brought about by retirements and promotions of district agronomists have caused some administrative difficulties during the year, but despite these a very high level of primary producer contact has been maintained as the following table shows:-

	1971-72	1972-73
<u>Individual Contacts:</u>		
Rural group meetings	380	440
On-farm visits	2,600	2,800
Office visits	3,200	3,400
Telephone queries	10,000	12,000
<u>Mass Media:</u>		
News items & articles (State & country papers)	253	272
Radio broadcasts	123	129
TV	9	6

As can be seen, the Agronomy Extension Section is continuing to place more emphasis on group extension work in order to rationalise time and resources. Of the 440 rural group meetings attended by district agronomists during the year in their capacities as lecturers or discussion group leaders, 350 were associated with the Agricultural Bureau of South Australia. The remaining 90 meetings serviced Rural Youth groups, informal farmer groups, schools and industry meetings. Much of this work, together with telephone enquiries, involve the officers in considerable demands on their own time outside of office hours.

Most of the radio work listed in the above table has been through the ABC Country Breakfast Sessions which have a big listening audience. Besides the news items listed, the Chief Agronomist provides a weekly session on the ABC Country Hour to summarise important developments and news of agronomic matters of State importance.

Television participation remains limited but comment should be made of the programme, "Down to Earth", on SES Channel 8 which covers the South East. For much of 1973 the District Agronomist at Mt. Gambier, Mr. Marrett, has been responsible for assisting with the organisation and compering of the session.

## 2. OTHER ACTIVITIES:

A large number of other activities were carried out by the Extension Section during 1972-73. These included:-

### 2.1 District reports

Officers provided a monthly report service on agricultural conditions for all districts throughout the year. Special reports were prepared on crop estimates and during critical periods of 1972, special surveys and reports were prepared on fodder supplies and seed availability for report to the Government. Other reports were furnished in individual districts on such matters as irrigation, crop damage and estimates of alternate crop acreages.

### 2.2 Registered cereal seed production

Officers in the Section inspected over 1,200 acres (486 hectares) of registered seed crops (wheat and barley) grown under the South Australian Seed Growers' Scheme. In 1972-73 this covered 17 growers of seed wheat and 16 growers of seed barley throughout the State. The provision of quality seed to South Australian farmers continues to be an increasingly important factor in maintaining quality grain production.

### 2.3 Demonstrations

District officers conducted a number of agronomic demonstration trials with cereals, alternate crops, pasture improvement methods and pasture cultivars. This demonstration work is an important part of agronomic advisory work.

### 2.4 Liaison

Liaison was carried out with:-

- \* Research workers in relation to investigational work in their respective districts.
- \* Industry representatives and commercial people in relation to trials and demonstrations conducted by these organisations.

## 2.5 Educational tours

A number of educational tours for farmers, agricultural students, interstate and overseas visitors, including a training programme for a Tunisian agricultural officer, were carried out during 1972-73.

## 2.6 Service to commerce & industry

The enquiry from and liaison with commerce and rural industries has continued to expand.

Considerable contact was maintained with personnel from most fields associated with agricultural services and marketing. Officers provided assistance and information to a wide range of commercial organisations, marketing boards and research organisations.

One significant development by the Branch in furthering liaison with agricultural industries was the establishment of the Crop Industries Study Group. This Committee has had discussions with representatives of the wheat, barley, oil seed, lupin and field pea industries. These meetings have been valuable in keeping the Branch informed on industry matters and co-ordinating Branch extension programmes in relation to these matters.

## 2.7 Judging of competitions

Extension officers assisted a number of Agricultural Bureaux with judging of grain competitions and were also involved in judging regional Rural Youth competitions in many parts of the State.

The special agronomist assisted as a judge in the Agricultural Produce Section of the Royal Show and the senior agronomist was a judge at the State finals of the A.B.C. Rural Youth competitions.

## 2.8 Special duties

Officers of the Extension Section have carried out a number of special duties associated with Ministerial enquiries and technical reports for other departments.

The special agronomist has been involved in a number of inspections and preparation of reports under the Rural Advances Guarantee Act, 1963, and continued assistance has been given to the South East Drainage Board.

Inspections and reports have also been required by the State Planning Authority for resubdivisions in many parts of the State. These reports require an assessment to be made on the suitability of each resubdivision as independent economic farming units. At least three such requests are being processed each week.

The principal agronomist has continued to serve as a member of the Primary Producers Emergency Assistance Advisory Committee; the Consultative Committee on Drought, the Bush-fire Research Committee and the Wheat Delivery Quota Advisory Committee.

Other officers were involved in lectures to agricultural technology students, in-service training schools, external examiners in crop production and practical agriculture at Roseworthy Agricultural College.

### 3. EXTENSION PROGRAMMES:

Since a more formal system of extension programme planning was introduced into the Branch in 1971, a number of significant programmes have been conducted.

Regional advisers' meetings held in each region three times each year are seen as important for developing and co-ordinating extension programmes.

A wide range of planned extension programmes were conducted in 1972. Some of the more significant programmes were:-

#### 3.1 Improving product quality (grain)

This year the Agronomy Branch again concentrated on two of the major aspects of concern to the grain industry - uniformity and control of grain insect pests.

##### 3.1.1 Recommended varieties

The need for more uniform samples, increased production of hard wheat and increased protein content of all wheat has been stressed in this programme.

The recommendations drawn up by the Advisory Committee on Wheat Quality has been widely publicised through mass and group media.

More emphasis in 1972-73 has been necessary on the growing of acceptable barley varieties which meet the standards demanded by local and overseas markets.

The Australian Barley Board has indicated that only Clipper is acceptable by the industry for malting and milling purposes, and hence they will receive only this variety into these grades. Information programmes stressing the reasons for this situation and the need to produce uniform samples free from admixtures are being conducted.

### 3.1.2 Grain inspect pest control

Following an information programme in 1971-72 supporting the grain industry publicity on this problem, it was decided a more critical assessment of the "on farm" situation was required. An on the farm survey was therefore conducted in 1972-73. Each district agronomist surveyed a number of farms (approximately 10) for grain pest infestations. This, in addition to alerting farmers, has given valuable on the farm situation information to back the 1973-74 programme.

The main points to emerge from this survey were:-

- \* Very few properties are entirely free of grain insect pest infestations.
- \* Seventy per cent of properties had moderate to heavy infestations at some source on the property.
- \* Spillage occurred on most farms and often this was a source of infestations.
- \* On 10% of the 91 properties, insecticides had been used incorrectly.

### 3.2 Alternate crops

An important programme during the 1972-73 season was a further assessment of the potential of alternate agronomic crops in various parts of the State. Observations and demonstration trials with oil seed rape, lupins and sunflowers were continued, together with dissemination of technical information on these crops to growers. Survey information on oil seed rape gathered in 1971-72 was collated into an Agronomy Branch Report.

### 3.3 "Off-target" herbicide damage

This programme aimed to minimise the damage from herbicides to vines and other susceptible crops. Following reports

of damage in 1971, this programme was developed to advise farmers of ways of avoiding "off-target" damage.

Agronomy advisers, council weeds officers, spray contractors and chemical resellers have been involved in the educational programme, the main part of which was conducted in the South East region.

The intensive educational and publicity programme resulted in a considerable reduction in the use of ester 2,4-D.

The extension programme had a twofold aim - firstly, to encourage farmers to use safer sprays such as amine 2,4-D on agricultural land adjoining vineyards, and secondly, to educate farmers to carry out spraying between mid-May and the end of July when vines were least vulnerable to damage.

During the year the use of ester 2,4-D dropped by 80% in the South East and there was a corresponding increase in the use of the safer herbicide, amine 2,4-D.

This programme will be expanded to other districts in 1973-74.

### 3.4 Pasture improvement

In the higher rainfall areas the main programmes were associated with pasture renovation in the Adelaide Hills where 12 chemical ploughing and sod seeding demonstrations were continued in 1972. These demonstrations have indicated the advantages of this method of pasture renovation, particularly on dairy farms.

In 1973, nine of the existing demonstrations will be maintained and two new demonstration sites will be sown this season at Willunga and Back Valley.

There is a big increase in this method of pasture improvement and areas sod seeded to improved species more than doubled in 1973.

In the Lower South East the cape weed control programme in pastures was continued and more emphasis was directed to the valuable place of lucerne on some soil types in the district.

In the cereal areas the importance of good legume pastures is being stressed. In the medic areas aspects which were emphasised were the need for:-

- \* More frequent sowings of medics at heavier rates.

- \* Early sowing of medics into paddocks where required.
- \* Early pest control.
- \* The importance of good legume pastures in increasing soil fertility to reduce effects of cereal root eelworm.

District officers were also involved in the assessment of new pasture cultivars through demonstration and trial plots over a wide area of the State.

### 3.5 Insect pests of lucerne crops

A regional extension programme was conducted in the northern lucerne growing areas to inform growers about the control of insect pests of lucerne seed crops during the late spring-early summer period.

A planned series of field days were held in the main lucerne seed areas of the Murrumbidgee, Clare and Booraburra districts. These field days supported by mass media publicity and farm visits emphasised the importance of early treatment, assessment of damage and control measures.

### 3.6 Fodder programmes

Due to the dry seasonal conditions and late seasonal break in parts of the State, such as the Murray Mallee, in 1972, special programmes were instituted to assist growers maintain young stock and finish other stock for sale. In conjunction with livestock officers, district agronomists compiled feeding programmes for growers in affected areas.

In the Mallee region, relevant information on drought feeding techniques, comparative costs of fodders and management practices were extended at special meetings, district conferences, through press and radio and personal contact. Information was also distributed through newsletters to Agricultural Bureaux. Application of this information enabled many farmers to maintain stock through the season on grain, and to finish stock for sale.

### 3.7 Weed control programme

#### 3.7.1 Yellow burr weed control

An extension programme was developed in conjunction with the Weeds Section and district council weeds officers aimed at controlling yellow burr weed in the Upper South East and Southern Murray Mallee districts.



An intensive publicity programme and close liaison with district council weeds officers stimulated many enquiries regarding this weed problem in the area. The programme will be continued.

### 3.7.2 Skeleton weed

The programme to help people identify and control skeleton weed continued in the South East, Northern and Eyre Peninsula districts. Well timed publicity, field days and close liaison with district council authorities alerted farmers to watch for new infestations.

Due to promising results obtained from the spread of skeleton weed rust in the Mallee region, a pasture programme is being developed.

### 3.8 Group media analysis

District agronomists spend a significant proportion of their time working with farmer groups. In some cases 20% of the officer's time is spent in this way.

To analyse the effectiveness of this educational effort two surveys of the extension audience covered by group media were carried out during the year. One in the southern Eyre Peninsula district defined more clearly the areas where contact through group extension was not being effectively achieved. The other survey was conducted on Yorke Peninsula and this revealed that district extension officers in that region had contact through the Agricultural Bureau with owners or managers of nearly two-thirds of the land in use for agriculture. To achieve such coverage with 20% of the officer's time indicates the high level of efficiency of group extension work in that district.

### 3.9 Group programmes

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.

The development of learning situations with these farmer groups has given excellent opportunity for in depth discussions on district problems.

The district agronomist at Murray Bridge is working closely with informal farmer discussion groups in the Murray Swamps district.

One investigational project in the Lower North involves the district agronomist working with a farmer group and research people assisting them to solve problems caused by stock grazing ryegrass in the Black Springs-Manoora district.

#### 4. STAFF:

##### 4.1 Appointments

Mr. G.D. Webber was appointed Senior Agronomist.

During the year Mr. R.C. Hagerstrom was appointed Senior District Agronomist to service Kangaroo Island War Service Land Settlers, whose stock mortgages were under control of the Lands Department.

Mr. A.E. Hincks was transferred to Jamestown as District Agronomist for the Upper North district.

Mr. D.M. Crawford was appointed District Agronomist for the Northern Mallee district.

Mr. F.C. Gross retired after thirty-nine year's service with the Department of Agriculture, and Mr. S.G. Williams took over his duties as Special Agronomist.

Mr. P.D. Fairbrother was transferred from Keith to Adelaide to take up the position of District Agronomist for the Central district.

Mr. P.M.S. Potter was appointed District Agronomist for Eastern Eyre Peninsula.

##### 4.2 Training

Additional training for extension officers continued to be an important objective of the Branch.

Mr. P.J. Mowatt left for New South Wales in January, 1973 to undertake the graduate diploma course in Rural Extension. He will be away for one academic year and on return will take up a new appointment at Naracoorte.

Four agronomists undertook an interstate tour of Victoria and northern New South Wales to study cereal production, high rainfall pastures, irrigation and alternate crops.

Mr. K.G. Bicknell attended a short course in Extension at Brisbane University.

Mr. P.D. Fairbrother attended a farm business management workshop at Albury, New South Wales.

The Principal Agronomist attended the Australian Extension Conference at Glenormiston, Victoria.

Mr. Holden attended the 1972 Commonwealth Sheep and Wool refresher course in South Australia.

#### 4.1 In-service training

Agronomists undertook the following Departmental in-service training:-

Four officers attended an advanced communications school.

One officer attended the Adult Learning School.

Two officers attended a Teaching Processes School.

Ten officers attended extension seminars with Professor Durfee.

Farm management training continued as part of the Branch training programme. Following training in farm management skills in 1971-72, further sessions were held in 1973 concentrating on partial budgeting.

Technical training was also increased with a number of extension officers attending Branch technical conferences on plant protection in Adelaide and Kabatiella on Kangaroo Island.

### 5. PUBLICATIONS:

#### 5.1 Bulletins

"Fodder Crops for Summer and Autumn", Extension Bulletin 3/70, revised.

"Lucerne Growing in South Australia", Special Bulletin 2/73.

"Medic Pastures for the Cereal Areas", Extension Bulletin 17/73.

#### 5.2 Agronomy Branch reports

"Soil Seed Rape Surveys, Trials and Demonstrations", Agronomy Branch Report No. 42.

5.3 Australian Extension Conference

"Some Aspects of Group Extension Programming in South Australia".

"An Analysis of the Group Extension Audience in Some Agricultural Regions of South Australia"

5.4 Prepared papers (technical conferences)

"Yarloop, Oestrogen and Kabatiella Problems".

"The Place of Cultural and Rotations Factors in Plant Production".

"Calibrating Ground Spraying Equipment".

5.5 District hand-out material

A number of papers were prepared during the year by district officers as hand-out material for district conferences and general distribution. These included the following:-  
"Linseed Growing in South Australia", "Soya Bean Growing in South Australia", "Grain Feeding", "Alternate Crops", "Wild Oat Control" and "Spray Seed".

BUSHFIRE PROTECTION SECTION

SECTION LEADER:

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

EXTENSION OFFICERS:

Mr. B.J. Francis

Mr. R.H.T. Freak

Mr. B.A. Green

SECRETARY, BUSHFIRE RESEARCH COMMITTEE:

Mr. L.D. Murray

## BUSHFIRE PROTECTION SECTION

### 1. SECTION ACTIVITIES:

The provision of a bushfire protection advisory service to all sections of the community continues to be the prime function of the Section.

The lower demand from rural landholders for assistance reported last year to be due to the "rural crisis", continued this year. It is anticipated that interest will now increase due to the improved financial position of many farmers.

Research effort concentrated on existing projects and two new investigations were commenced and these are reported in detail below.

Environmental issues continue to be a very important aspect of the work programme. The close liaison established with the Department of Environment and Conservation has already resulted in improved standards of fire protection in some national parks. General agreement has also been reached to adopt the policy that fire protection plans be integrated into the overall management plan for each national park.

As reported last year, a submission was made to the working party set up by the Minister of Agriculture to enquire into the re-organisation of rural fire control in South Australia. In June, the Minister announced that Cabinet had approved plans to establish a Country Fire Service as a controlling body to co-ordinate and integrate the existing committees and bodies associated with rural fire control in South Australia. It is probable that the activities of the Bushfire Protection Section of the Agronomy Branch will become the responsibility of the new statutory body, once the enabling legislation is passed by Parliament.

### 2. EXTENSION ACTIVITIES & PUBLICITY PROGRAMMES:

#### 2.1 Extension activities

##### 2.1.1 Farm & other property visits

As indicated earlier in this report, the demand for farm visits has continued to decline from 120 in 1971-72 to 72 this year. However, requests from private householders living in the Adelaide Hills and from Government departments responsible for land, particularly national parks, have increased. Thirty-one different national parks were inspected during the year.

### 2.1.2 Group extension

Twenty-nine meetings of Agricultural Bureaux, Rural Youth and Emergency Fire Services organisations were attended during the year by officers in the Section who gave lectures and lead discussions. Three fire protection field days were also attended.

### 2.1.3 Office enquiries

Telephone, office calls and postal enquiries increased during last summer. Most information was sought on the type of restrictions imposed by a fire ban and what additional restrictions are imposed by local councils. The difficulties of informing the public, particularly those planning camping holidays, stimulated a study into the establishment of a central telephone answering service which is reported under Special Projects.

## 2.2 Publicity programmes

The following programmes have been undertaken during the year:-

### 2.2.1 Rural Youth community aid programme

This was a co-operative programme with the Rural Youth Movement to give clubs the opportunity of carrying out fire protection on a property in their local community.

The 1972 programme resulted in 24 clubs competing for first prize, which was awarded to the Keith Club.

### 2.2.2 Bushfire television films

A series of five 30 second television films were again produced this year for national distribution. This programme was carried out in co-operation with the Woods and Forests Department with finance being provided by the Australian Forestry Council. Each year the effectiveness of the programme is evaluated by telephone survey and modifications made for the following year's productions.

The films aim to give the general public simple fire prevention messages and action to be taken if trapped in a bushfire.

### 2.2.3 Fire Prevention Week programme

Fire Prevention Week was held from 21st to 28th October, 1972. The programme is co-ordinated by the Committee

with representatives from the Emergency Fire Services, South Australian Fire Brigade, the Australian Fire Protection Association and the Bushfire Research Committee. Mr. Murray is Secretary of the Committee and Mr. Graham represents the Bushfire Research Committee.

The aim of the programme is to inform all sections of the community about general fire prevention measures and especially the need to reduce fire hazards before the coming summer.

Activities this year included a parade of fire units through the city, displays and demonstrations of fire equipment, evacuations of schools and city buildings, poster competitions and other activities designed to obtain mass media coverage for fire prevention

#### 2.2.4 Fire Alert Day

The Minister of Agriculture proclaimed January 2nd, 1972 Fire Alert Day to warn the general public that the day was the first State-wide fire ban for the season and to seek their co-operation in fire safety.

This programme is carried out annually and involves the immediate distribution of a prepared press release by the Minister at 7.00 a.m. in the morning of the first State-wide fire ban.

#### 2.2.5 Bushfire prevention signs programme

The final stage of the Bushfire prevention sign programme was completed prior to the 1972-73 fire season, when 29 new signs were produced and distributed to those district councils whose existing signs required replacement.

The complete programme now involves 87 signs located in 42 district councils. These signs, produced by the Highways Department, carry short fire prevention messages and the Smokey symbol. All signs are now standardised in regard to construction, size and the use of reflectorised lettering.

In addition, the twelve signs designed for display during years of abundant growth on the main roads leading into the pastoral areas are being renovated. Widespread rains in the first half of 1973 indicate that these signs should be erected before the 1973-74 summer.



### 2.2.6 Summer publicity programme 1972-73

The programme was launched by the Minister of Agriculture at a very successful press conference at the Alpine Restaurant on 27th November, 1972.

This year's theme, "Stamp Out Bushfires" was outlined to representatives of all mass media in South Australia and presentations made of special fire prevention kits. The kits contained copies of the television films, a specially recorded radio jingle, car stickers and a suitably mounted "bushfire boot".

Good support was given by all mass media during the summer fire season.

### 2.2.7 Smokey's party

The annual Smokey's birthday party was held on 24th January, 1973 at the Adelaide Zoo.

The 2,000 children present were entertained by personalities from all television and radio stations. Widespread coverage was given to the party and to the subsequent prize winner's visit to Kangaroo Island. The programme, now in its twelfth year, reaches many more thousands of children through children's television programmes.

## 3. APPLIED RESEARCH PROJECTS:

### 3.1 Fire tolerance of fence posts - B.T.J. Graham & B.A. Green

A large scale trial to test the relative degree of fire tolerance of commercially treated wooden fence posts was carried out this year at the Mt. Crawford Forest Reserve.

The following table indicates the fire tolerance performance of six posts of each type, when subjected to a fire from a 1.5 lb. grass fuel quantity.

Fence Post Type	Undamaged	Damaged	Destroyed
Pinus radiata - creosote	6	0	0
Sugar gum - C.C.A. + 3S	6	0	0
Sugar gum - C.C.A.	5	0	1
Pinus radiata - C.C.A. + 3S	4	0	2
Pinus radiata - C.C.A.	0	0	6

Tests were also conducted using 3 lb. and 10 lb. fuel quantities. These results indicated a similar order of fire tolerance but, as could be expected, with more posts lost with increasing fuel quantities. In fact, at the 10 lb. rate, 2 creosoted pine and 4 C.C.A. + 3S treated sugar gums were either destroyed or damaged.

### 3.2 Minimum safety requirements for incinerators - B.J. Francis

This project is now completed with four manufacturers producing incinerators designed to meet minimum fire safety standards. Local government bodies which impose restrictions on the lighting of fires in the open during the summer months can now use this standard as a guide if they wish to exempt the use of incinerators.

### 3.3 Spark arrester design - B.J.T. Graham & L.D. Murray

Research work sponsored by the Bushfire Research Committee is being conducted by the Mechanical Engineering Department of the Adelaide University.

This year's programme has resulted in the development of the necessary equipment to test the effectiveness of spark arrester/silencer units for very large diesel motors in the 300-400 horse power range.

Recent developments in the tractor spark arrester field have resulted in a range of arresters suitable for tractors up to 200 H.P. now being available commercially.

Future research will now concentrate on the development and testing of arresters suitable for high horse powered road vehicles.

### 3.4 Grass fuel measurements - B.A. Green

This year's measurements were widened to include samples from Yorke Peninsula, Northern agricultural and Eyre Peninsula districts. A total of 103 samples were taken and varied from 0.26 tonnes per hectare in the Mallee districts up to 6.86 tonnes per hectare in the high rainfall areas of the South East. The work will now endeavour to establish simple guidelines for fuel reporters to estimate the amount of grass fuels present in the various fire ban districts of the State.

3.5 Time of curing of annual vegetation -  
B.J. Francis

Investigations have now reached the stage when curing zones have been mapped for the State. This information was taken into account by the special inter-Departmental committee set up by the Minister of Agriculture to advise on the revision of meteorological district boundaries of the State.

The Committee's report was approved by the Minister of Agriculture and submitted to the central office of the Bureau of Meteorology for future adoption. In South Australia, the Commonwealth meteorological districts are identical with the State fire ban districts.

Both the grass fuel measurement and time of curing projects are being conducted in close liaison with the Bureau of Meteorology.

See map showing curing zones on page 24.

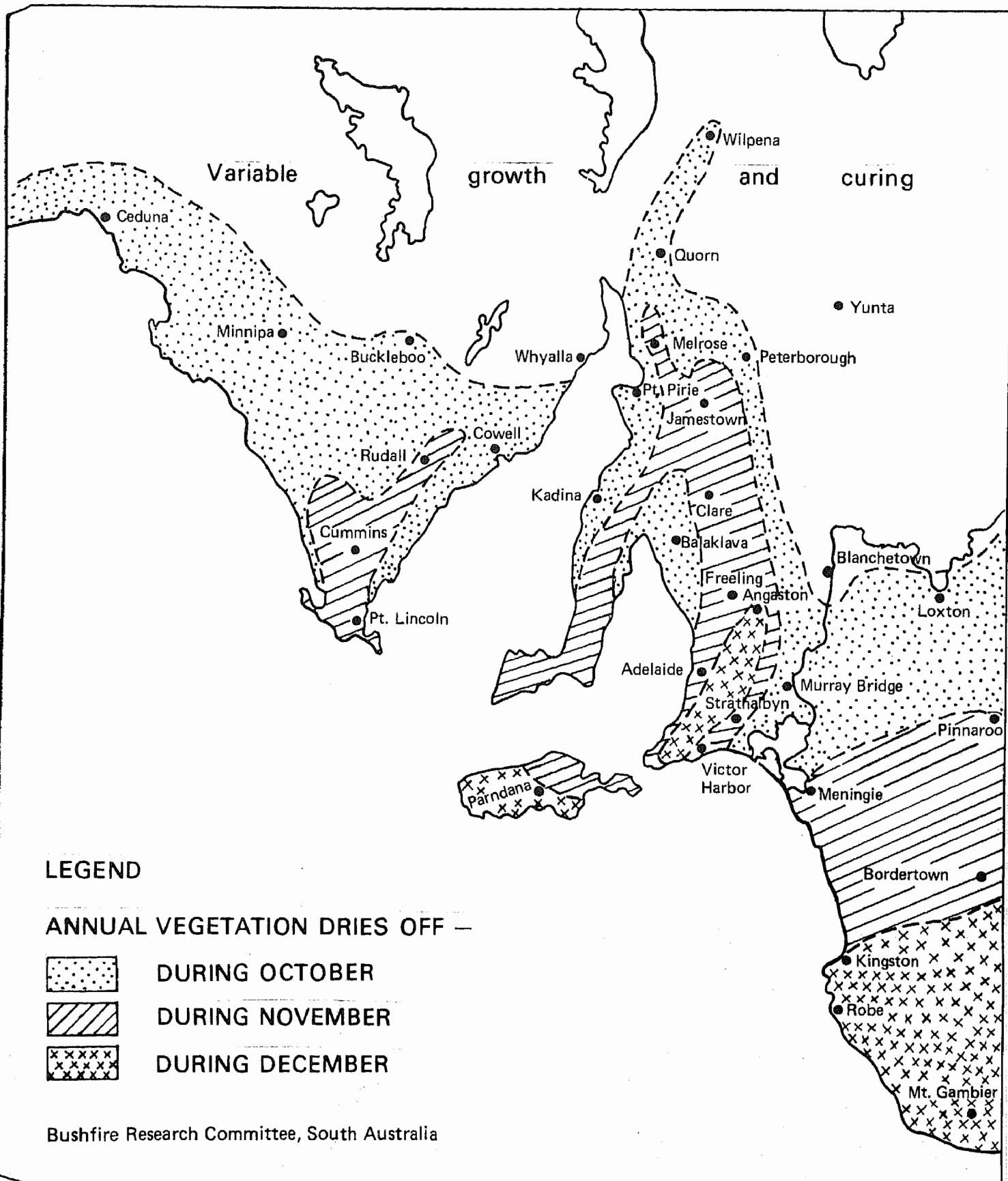
3.6 Herbicidal control of unwanted vegetation

This project, which is being conducted in conjunction with the Weeds Section, continued with emphasis on examining deleterious effects on native trees from the continuous use of herbicides.

The final chemical applications were completed during the year and the trial will be assessed during the next summer.

The large scale result demonstrations laid down on roadsides in ten council areas were discontinued and the display signs removed.

# CURING ZONES - ANNUAL VEGETATION (AVERAGE YEAR)



#### 4. MINISTERIAL REPORTS:

Reports have been prepared in regard to a wide range of subjects:-

- \* The establishment of the Inner Adelaide fire ban district.
- \* The advisability of restricting the use of rotary slashers on fire ban days.
- \* The problems associated with the operations of fire danger indicator signs.
- \* The Proceedings of the National Conference on Rural Fire Prevention Publicity.
- \* The report on the action taken to publicise techniques on human survival in bushfires.

#### 5. SPECIAL PROJECTS:

##### 5.1 Local government fire information

A feasibility study was conducted into the possibilities of establishing a central telephone answering service to provide the general public with information regarding local government fire laws.

The study, conducted with the co-operation of the Local Government Association, resulted in a negative response from the majority of councils and the matter has been deferred.

##### 5.2 Incendiarist detection project

During November, 1972, five investigations indicated that an incendiarist was active in the Mitcham hills district. Following a conference of interested parties, it was decided that efforts should be increased to detect the culprit. A novel and secret system was developed and put into operation during the summer. It will be used again next year.

##### 5.3 Fire access track programme

Nine access tracks costing \$6,907 were constructed in seven district council areas during the year.

This programme, now in its twelfth year, has been responsible for the construction of nearly 482 kilometres of tracks to facilitate the movement of fire fighting vehicles in inaccessible country. Fifty-five councils have benefited from this programme.

Increasing emphasis is being placed on selection of the most suitable location and appropriate construction methods of tracks to ensure a minimal disturbance to the natural environment.

## 6. CONFERENCES & COMMITTEES:

### 6.1 National Conference

The first National Fire Prevention Publicity Conference was held in Adelaide on 13th-14th November. Sponsored by the Bushfire Research Committee and organised by the staff, delegates attended from every rural fire authority and advisory department in Australia.

### 6.2 Other conferences

Members of the staff attended the following conferences:-

- \* E.F.S. regional officers and Association delegates
- \* E.F.S. communication
- \* Eyre Peninsula Fire Fighting Association
- \* Highways Department Eyre Peninsula regional engineers
- \* Agronomy Branch
- \* Lower South East Fire Fighting Association.

### 6.3 Committees

Staff also attended meetings of the following committees:-

- \* Bushfire Research Committee - 7 meetings
- \* Publicity Sub-committee - 7 meetings
- \* Fire Prevention Week Committee - 5 meetings
- \* Roadside Vegetation Committee - 5 meetings
- \* National Park Bushfire Research Liaison Committee - 4 meetings
- \* National Trust - Marble Hill Committee - 4 meetings
- \* Inner Adelaide Fire Ban Committee - 2 meetings

7. STAFF:

No changes occurred in the staff during the year. The stability and experience of the present staff has enabled continuity in the work programme and the development of a team approach to the Section's efforts.

7.1 Training

B.J.T. Graham and B.A. Green attended a one week Communications School during May, 1973.

8. PUBLICATIONS:

8.1 Special publications

"Bushfire Protection in South Australia for the 1970's" - A 56 page booklet compiled by D.R. Douglas and B.J.T. Graham. 25,000 copies will be available for free distribution to all rural landowners and E.F.S. personnel in the State. The Commonwealth Development Bank, the Associated Banks in South Australia and the stock firms provided financial assistance with this publication.

"Bushfire Research Committee Report for 1969-1972" - a 16 page illustrated report of the Committee's activities for that period. Compiled by L.D. Murray and B.J.T. Graham.

8.2 Extension articles

"A Guide to Farm Fire Units" - B.J. Francis. Journal of Department of Agriculture, November, 1972.

8.3 Brochures, leaflets & stickers

Substantial distributions of leaflets and brochures on "Bushfire Safety" and "Home Fire Protection" were made during the year. 30,000 "Stamp Out Bushfire" stickers were also widely distributed.

CROP AGRONOMY SECTION

SECTION LEADER:

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

RESEARCH OFFICER:

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

ASSISTANTS:

Mr. N.M. Brooks, R.D.A.

Mr. S.G. Cornish

Mr. P.M. Fry

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

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

Mr. C.A. Schubert



CROP AGRONOMY SECTION

1. SECTION ACTIVITIES:

Crop research in the Agronomy Branch falls into two categories. One is concerned with the evaluation of current and new cultivars and selected advanced crossbreds for yield and quality characters. The other area of research undertaken by the Section is concerned with the improvement of cultural practices for crops grown in the State.

All staff members are stationed at Northfield where equipment is also housed and maintained. Units carrying plot seeding and harvesting equipment operate throughout the State from this centre. This system is however under review. Most trials are conducted on farmers' properties although some research centres (notably Turretfield and Minnipa) are considerably involved.

During the year field staff have been re-organised so that seeding and harvesting units operate in selected regions covering all the crop agronomy trials in that region trials conducted with farmer equipment are being phased out.

The wheat programme is dominated by trials designed to assess the agronomic features, grain yield and grain quality of new and established bread-wheat cultivars and crossbreds.

To make this work more effective and hasten the testing and possible release of new cultivars, closer liaison has been established with breeding organisations. A much larger number of advanced crossbreds will be tested in future. To cater for this additional material, a series of primary testing sites were set up in 1973 (Turretfield, Booleroo Centre, Urania and Loxton, with Minnipa to be added in 1974). New equipment has been added and experimental designs changed. In addition over 20 secondary sites throughout the State have been established to test recommended and approved varieties, recent releases and a limited number of very promising advanced crossbreds.

In a less comprehensive series of trials (6 sites) varieties and crossbreds with potential as biscuit wheats are conducted in the higher rainfall, low protein areas. Limited attention is also being paid to durum wheats.

The barley performance programme is of similar design. Primary sites at which extensive crossbred material from the Waite Institute and the Western Australian and Victorian

Departments of Agriculture is being evaluated, are at Turretfield, Brentwood, Crystal Brook and Cummins. Secondary trials which contain recommended and new varieties as well as selected advanced crossbreds are conducted at some 20 sites. Whilst the major effort is directed to the evaluation of yield and malting quality, increased attention is being given to the selection of feed type barleys (both forage and grain), suitable for those areas where soil fertility and/or seasonal conditions rarely permit malting quality grain to be produced.

Oats have not been widely tested for a number of years. Increased attention has been directed to this crop with further testing sites, particularly in the higher rainfall areas. An increased number of crossbred lines from Roseworthy and the Western Australian Department are being evaluated at four primary sites, viz:- Minnipa, Turretfield, Wunkar and Bordertown.

Oil seed rape is but one of several alternate crops on which limited work has been initiated.

Progress with alternate crops will be restricted until a crop agronomist is appointed to work on these crops. In the meantime a series of comparative crop trials have been laid down in nine of the more favourable districts in 1973 using existing staff and equipment. The object is to compare the economic returns from crops such as peas, lupins, linseed, oil seed rape and safflower with the winter cereals.

Research in the Section has in the past been designed to examine cultural practices limiting production, such as the current work examining the poor performance of Clipper barley on deep sands of low fertility.

This type of agronomic work is now under review. The need is seen to look at cropping systems as a whole and consider the total environment to maximise crop production rather than investigating certain aspects without proper integration.

## 2. RESEARCH PROJECTS:

### 2.1 Wheat variety trials - T.G. Heard

#### 2.1.1 Bread types

A total of 43 varieties and advanced crossbreds were included in 34 trials in 1972-73. Because of the dry season only 29 trials were harvested. Features of the trials were:-

- \* Extreme variation in mean yields recorded at different sites (e.g. less than 0.3 tonnes/ha at Sandalwood to more than 3.5 tonnes/ha at Saddleworth).
- \* No significant difference in yield between many or all of the varieties at some sites.
- \* The inconsistency of some varieties from site to site, Halberd being notable in this respect.

There was no one outstanding variety in this series of trials. WW31 (WW80 and WW15<sup>2</sup>) a crossbred from New South Wales was the most consistent and had the highest mean yield. It is anticipated that this good quality semi-dwarf line may be registered after the 1973-74 harvest.

### 2.1.2 Biscuit types

A series of varieties and crossbreds selected for their potential as biscuit flour wheats were sown at four sites in the Bordertown district where a group of local growers have formed an Association (The Soft Wheat Growers' Association) which is actively promoting this type of wheat. These entries were also included in standard trials at Yeelanna, Farrell Flat and Saddleworth (traditionally lower protein sites). A biscuit flour should ideally not have a protein level above 8.5%. The 1972 trials produced no varieties with a significant yield advantage over Pinnacle and in quality only two Tasmanian varieties, Isis and Mersey were its equal as biscuit wheats.

### 2.1.3 Durum wheats

Durum wheats are used for the production of pasta products. To pursue further the yield, quality and future potential of durum wheats in the South Australian environment, a group of durum crossbreds and varieties were again tested at five sites. Two sites failed because of drought. A crossbred line from New South Wales (56109) had a mean yield equal to Halberd; and together with the New South Wales variety, Duramba, appears to have most potential in South Australia. However, the high failure rate of durum wheats in the lower rainfall areas is disturbing as a high protein level is a requirement of durum wheat and this is unlikely to be achieved in the high rainfall districts.

## 2.2 Barley variety trials - B.J. Marshall

Malting and feed grain crossbreds, together with standard commercial varieties, were tested at 18 sites throughout the barley growing districts of the State. A feature of the atypical season was the performance reversal from previous

years in several lines.

### 2.2.1 Malting barley trials

Six malting varieties of South Australian and Victorian origin were widely tested in 1972-73. The Victorian variety, Weeah, had the highest mean yield although its quality was below that of Clipper.

		Weeah	Clipper
Mean of 13 trials	Yield	1,487 kg/ha	1,416 kg/ha
	Screenings	15.6%	10.5%

In 49 comparisons from 1967-1972, Clipper has a 2% yield advantage over Weeah.

Though not acceptable as a malting variety, Ketch is being more widely grown in South Australia, particularly in the drier areas. In 18 comparisons with Clipper in 1972, its mean yield exceeded that of Clipper by 9%. In areas where seasonal conditions rarely permit the production of a malting quality grain farmers are realising that Ketch graded No. 4 probably gives them their best financial return over a period of years.

### 2.2.2 Feed barley trials

Two groups of two-row feed grain crossbreds from the Waite Agricultural Research Institute breeding programme were widely tested in 1972. The later maturing group was confined to areas of better rainfall where high soil fertility often places limitations on the quality of grain produced. From nine trials, four lines exceeded the mean yield of Clipper with the top one, WI 2197 (Bonus X C.I.3576), out-yielding Clipper by 8%. In the early group, tested in nine lower rainfall localities where limiting moisture and quick finishes reduce the prospects of producing malting grain, none out-yielded Ketch, but WI 2274 (C.I.3576 X Union<sup>2</sup>) equalled that variety and together with WI 2273 and WI 2271 out-yielded Clipper.

### 2.3 Oat variety trials - T.G. Heard

A total of 13 varieties and crossbreds were sown in eight trials, three of which failed due to drought.

Swan was the highest yielding commercial variety but in two to five comparisons with Swan, four crossbreds from

Roseworthy and one from Western Australia, exceeded the mean yields of Swan. Top of these was the Roseworthy crossbred OXB 196 (Orient X Mulga X Belar) X (Mulga X Belar X Orient).

#### 2.4 Oil seed rape variety trial - T.G. Heard

As a follow-up to a trial conducted at Turretfield in 1971, two trials were laid down in 1972. In the first, a series of varieties designated Raffola from Pacific Seeds Ltd., were compared with Arlo and Target. Yields varied from 1,000-1,800 kg/ha with the line Raffola 2, the top yielder significantly out-yielding Arlo and Target. In a somewhat later sown trial some of the Raffola lines were tested against four Canadian varieties with Arlo and Target as checks. Yields were considerably lower in this trial, the top yielder being Echo at 1,120 kg/ha.

The main information coming from this work is that profitable yields are possible from oil seed rape in spite of a late sowing (late July), and an unfavourable season.

#### 2.5 Trials with alternate seed dressings - T.G. Heard & A.J. Dube

Farmers are no longer allowed to use seed dressings based on organic mercury and chlorinated hydrocarbons because of the fear of residue problems.

This Section, in conjunction with the Plant Pathology Section, has therefore been active in evaluating alternate materials. Trials in 1972 were designed to determine the lowest concentrations of a number of the new materials, but they were largely unsuccessful because of the dry conditions.

#### 2.6 Effect of seeding time on wheat yield - T.G. Heard

In time of seeding trials carried out at Turretfield from 1969-71 on the varieties Halberd, Glaive and Summit, a somewhat similar response pattern emerged for each variety, with highest yields coming from seeding in the last week of May and the first two weeks of June.

A similar trial was conducted in 1972 using the variety Halberd only. Seeding ranged from June 1st to September 8th. The yield pattern was again similar. Maximum yields came from the dowing on June 16th (4.57 tonnes/ha) after which yields steadily declined as seeding became later over the next 84 days, to fall to 0.65 tonnes/ha with the latest seeding.

## 2.7 Response of barley to nitrogen fertiliser - B.J. Marshall

When Clipper barley is sown on some sandy mallee or solodized solonetz soils, its early growth is slow and its yield advantage over Prior is much less than in other situations. This slow early growth has resulted in wind erosion in some areas and excessive weed competition in others.

On a sandy mallee soil at Bute in 1972, three rates of urea were applied to plots of both Clipper and Prior at seeding. Growth response was measured over the first ten weeks and significant responses of growth to applied nitrogen were obtained as urea applications increased from 43 to 67 to 134 kg/ha. Differences between the two varieties were rarely significant. At harvest, however, there was no significant increase in grain yield or grain quality with increased nitrogen rates in either variety, nor did the varieties differ significantly in yield. When justifying the use of nitrogen, one must remember that the wind erosion hazard was reduced and the barley competed better with weeds. In a more normal season it is conceivable that the increased early growth could have increased grain yields. This investigation is being continued and extended to other areas of similar soil type in 1973.

## 2.8 Pre-harvest protein determinations in barley - B.J. Marshall

This work is designed to determine the effect of time and method of sampling on the pre-harvest grain protein levels, and in turn relate these figures to the protein content of the delivered grain. The study is part of a joint exercise between the Agronomy Branch and the Australian Barley Board aimed at finding explanations to some irregularities encountered between "pre-harvest" and "delivery" grain protein levels when received by the Board.

Five paddocks in various environments were sampled daily using three sampling methods for up to 21 days before harvest and each sample analysed for protein. At harvest, each header box was sampled as it filled and likewise analysed for protein. The following observations were made:-

- \* There is no change in grain protein levels over the last 10 days before maturity, and this is possibly true for up to 20 days under slow ripening.

- \* The method of sampling as recommended by the Board and another method in which the paddock is crossed twice during sampling, gave equally satisfactory estimates of the grain protein of the paddock. Sampling from the edge of the paddock is not satisfactory.

The Australian Barley Board sampled each load from a series of paddocks throughout the State from which pre-harvest samples had been collected under supervision and protein determined. This work, together with the work reported above, enabled these further observations to be made:-

- \* Thorough mixing of a sample before analysis for protein is very important.
- \* The Udy method of protein analysis is more accurate at the critical lower protein ranges (e.g. 10-12%) and becomes progressively less accurate as levels rise above 14%.
- \* Paddock variation does occur.

Much of this work will be repeated and certain refinements made in what is hoped will be a more normal season in 1973 with grain protein levels much lower than in 1972.

#### 2.9 Wind losses in barley - B.J. Marshall

Losses from wind damage in barley can be considerable. The newer varieties are reputed to have advantages over older varieties in this respect. A comparison was made at Turretfield on five commercial varieties measuring grain losses over a 72 day period (from 17 days before harvest to 55 days after harvest). Losses were expressed as a percentage of the yield harvested from the same varieties in an adjacent trial.

	% Loss		
	At harvest	34 days after harvest	55 days after harvest
Noyep	0.4	1.7	13
Ketch	Nil	0.6	5
Prior	Nil	1.4	20
Clipper	Nil	0.7	3
Weeah	Nil	1.4	8

### 3. MINISTERIAL REPORT:

In conjunction with the Crop Industries Study Group, a report was prepared on the question of closer liaison between the Agronomy Branch and the Australian Wheat Board. This is part of the South Australian Government's rural policy.

### 4. REGULATORY SERVICES:

Mr. M.R. Krause was the South Australian representative at an all-states meeting in Sydney in February called to discuss draft legislation on the "Registration and Control of Wheat Varieties in Australia" and make recommendations to Agricultural Council.

### 5. STAFF:

#### 5.1 Conferences & courses

- \* Mr. T.G. Heard was one of the South Australian Department's representatives at an Australian Specialist Conference on Crops of Potential Economic Importance held in Sydney in August, 1972.
- \* Messrs. Heard, Marshall and Krause went on the spring tour of inspection of the Barley Improvement Technical Committee visiting the Victorian Wheat Research Institute at Horsham and two malt houses at Ballarat before attending a symposium organised by the Committee in Melbourne in October, 1972.
- \* Mr. B.J. Marshall attended the Extension Workshop conducted by the Extension Branch at Roseworthy College in February, 1973.

#### 5.2 Study leave

Mr. T.G. Heard left on June 30th for a three months period of overseas study leave. In Europe, Canada and the U.S.A. he will study the evaluation of new wheat cultivars, registration procedures, the segregation of receivals and marketing.

#### 5.3 Committees

- \* Mr. T.G. Heard is Secretary of the South Australian Committee on Wheat Quality
- \* Mr. M.R. Krause is a member of the Barley Improvement Technical Committee



- \* Mr. T.G. Heard is Co-ordinator of the Interstate Wheat Variety Trials
- \* Mr. M.R. Krause and Mr. B.J. Marshall share the responsibility as the Department's representative on the Australian Barley Board's Central Classification Committee.

6. EXTENSION:

Addresses to Bureau conferences:-

- \* Mr. M.R. Krause (March, 1973) - "The Latest Wheat Variety Developments", Hummocks Branches, Bute
- \* Mr. M.R. Krause (March, 1973) - "Wheat Varieties Summary", Yorke Peninsula Branches, Minlaton.

7. PUBLICATIONS:

Reuter, D.J., Heard, T.G. & Alston, A.M. (1973) - "Correction of Manganese Deficiency in Barley Crops on Calcareous Soils".

- \* "Manganese Sulphate Applied at Sowing as Foliar Sprays"
- \* "Comparison of Mixed and Compound Fertilisers"
- \* "Application of Elemental Sulphur"

Journal of Experimental Agriculture and Animal Husbandry, Vol. 13, No. 63.

Heard, T.G., Marshall, B.J. & Krause, M.R. - "Cereal Variety Recommendations for 1973". Department of Agriculture, S.A. Extension Bulletin 47/72.

7.1 Publications for limited distribution

Marshall, B.J. - "Barley Varieties in South Australia".

Marshall, B.J. - "Barley Varietal Identification".

Marshall, B.J. - "Barley Classification in South Australia".

Marshall, B.J. O "Which barley variety for the drier districts?".

ENTOMOLOGY SECTION

SECTION LEADER:

Mr. P.R. Birks, B.Ag.Sc.

RESEARCH OFFICERS:

Mr. P.G. Allen, B.Ag.Sc.

Mrs. J. Moulden, B.Ag.Sc.

Pesticides Research Officer - Vacant

ASSISTANTS:

Mr. C. Phillips, R.D.A.

Mr. R.B. Jenkins

Mr. K.R. Henry

## ENTOMOLOGY SECTION

### 1. SECTION ACTIVITIES:

The development of modern pesticides has permitted a standard of pest control never previously possible, but it has had environmental repercussions in the development of resistance, and new pest complexes and of pesticides residue problems in agricultural produce and in the general environment. This has in turn led to the placing of increased attention on biological and other non-chemical measures, either on their own or, when used in conjunction with chemical control, commonly called "integrated control".

Agronomic production however, involves extensive areas of relatively low value produce in which quantity is rather more important than quality. Climatic variations from year to year result in markedly differing pest activity each year. Very little spraying is of a routine preventative nature, or carried out on a regular schedule. Where heavy infestations occur the problem is rather, should I spray, and then with what and at what particular time to get the most benefit for the cost?

With the exception of resistance problems in grain storage pests, which arise in an industrial rather than a production situation, the environmental repercussions of chemical control in agronomy have involved residue problems rather than resistance or induced pest problems. The solution to residue problems has been sought in this Section, by looking for alternative, less persistent chemicals and thoroughly testing these, so that similar or new environmental problems are avoided before the general adoption of the new material.

There has been practically no progress in rationalising pesticide use against any Australian pest based on a careful and thorough assessment of the amount of damage it causes. The work on Aphodius tasmaniae being carried out by Mr. Allen is now beginning to produce results which should enable a farmer or farm adviser to make an objective assessment with the absolute minimum effort, of the need for treatment. Although the merits of very early treatment have been known for more than fifteen years, this has required a largely subjective assessment which is difficult to communicate and has therefore not been widely adopted. While further work is required on this pest, the principles being developed have application to other pest control situations and to population assessments being made, especially on sitona weevil.

Plague grasshopper investigations by the Section have reached a stage where many landowners have been given an opportunity to assess ultra low volume spraying as a technique and to test it on a scale that is meaningful. In the worst affected areas, namely the Orroroo district, landowners are now proposing to institute for the first time, a district control programme against plague grasshoppers. A small plague locust outbreak, mainly in the Cleve and Cowell areas, was combatted by conventional ground spraying equipment. In both cases emphasis has been on selection of spray targets so that maximum benefit is obtained for minimum cost and effort.

Unlike most of our other insect pests, sitona weevil was considered a more likely prospect for biological control because it is an introduced pest and not particularly troublesome in the areas of its origin. Having sought and obtained the co-operation of C.S.I.R.O., a joint programme has been initiated for which we aim to provide background information on the biology of sitona weevil in Australia to enable parasites to be assessed and the best selected for introduction.

Investigations on grain storage problems has been largely an assessment of the present farm infestation situation. This has provided important background information required for extension purposes and indicated the situations likely to be met in putting a farm clean-up programme into operation. Emphasis is being placed on hygiene rather than on chemical control.

## 2. RESEARCH PROJECTS:

### 2.1 Damage assessment of pasture cockchafer (*Aphodius tasmaniae*) in pasture - P.G. Allen & K.R. Henry

A sequential plan is being developed to assist farmers or farm advisers in deciding whether it is economic to treat a particular infestation. Frequency distribution samplings were shown to fit negative binomial distributions and a significant positive correlation between density and distribution has been shown, so that the same larval sampling technique can be used through the range of densities likely to cause marginal economic loss.

A pilot sheep grazing trial involving equal but variable stocking rates on sprayed and unsprayed areas, showed that meaningful differences in pasture production can be demonstrated where there is a larval density of 470 larvae per square metre. Winter production of dry matter was 1,812

kg/ha compared with 608 kg/ha in the untreated area. By the end of spring dry matter production was 3,718 kg/ha compared with 1,704 kg/ha.

A more extensive grazing trial involving five different larval densities is now being compared with an insecticidally treated area.

## 2.2 Release of introduced dung beetles in South Australia - P.G. Allen & K.R. Henry

Field releases were made of dung beetles introduced and reared by C.S.I.R.O. to remove dung accumulations, increase soil fertility and to control the breeding of flies in dung. Since August, 1972, fifteen releases have been made covering a wide range of cattle areas in the State. A cold-tolerant strain of Onthophagus gazella has been introduced at ten different sites; O. binodus to three sites, and Onitus alexis and Euoniticellus africanus at one site each.

## 2.3 Release of a parasite to control clover seed moth - P.G. Allen & K.R. Henry

The clover seed moth, Coleophora frischella, is a pest of strawberry and white clover seed production and has been controlled by weekly applications of parathion.

In mid-January, 1973 adult wasps, Bracon variegator parasites of Coleophora, obtained from the Tasmanian Department of Agriculture, were released at Greenways in the South East. Assessment of the success of establishment will be made in January, 1974.

## 2.4 Argentine stem weevil - P.G. Allen & K.R. Henry

During the summer of 1972-73, Argentine stem weevil (Hyperodes bonariensis) was recognised for the first time in South Australia and caused severe damage to putting greens on a number of golf courses. The incidence and activity was evaluated with reference to published and interstate experience and suggestions for controlling them prepared and forwarded to greenkeepers.

## 2.5 Sitona weevil investigations - J. Moulden, P.R. Birks, P.G. Allen & R.B. Jenkins

Sitona humeralis, an immigrant from Europe-North Africa reached immense populations during the last four years, especially in the agricultural areas growing annual medic pastures, and caused severe defoliation of legumes in spring and in dry autumns.

While chemicals are available which kill sitona adults, the mobility of the insect and the vast areas of infestation, severely restrict the usefulness of chemical control techniques. Following a preliminary assessment of the potential for biological control, an approach was made to C.S.I.R.O. for assistance in a parasite search and evaluation programme. A joint investigation is now developing and important background information is being obtained on sitona activity in South Australia.

#### 2.5.1 Adult biology

With the assistance of groups of farmers at Narridy, Salter Springs and on Yorke Peninsula, it has been shown that egg development begins in late February and may be complete by early May if food is available. Without food this may be delayed by six weeks.

Old and new generation adults may overlap by three to seven weeks, although the proportion of the population which overlaps was found to be small. Egg laying continued to within one or two weeks of the death of old adults. New adults began emerging from the 8th to 15th October and 97% had emerged by mid-November. Adult activity continued until mid-December.

#### 2.5.2 Larval biology

Irrigation bench cultures indicated higher survival of larvae in loam than in sand. Further refinement in rearing techniques will be necessary to permit mass rearing. Larval damage assessment studies will require closed pots to prevent root escape.

#### 2.5.3 Field sampling

A sample unit of 108 cm<sup>2</sup> used for stratified random sampling indicated a mean larval density of 25 per 1,000 cm<sup>2</sup> in a paddock of annual medic at Roseworthy. However, the density indicated by emergence traps for adults was approximately ten times higher, indicating deficiencies in sampling techniques.

#### 2.5.4 Toxicity of maldison

As an "incidental" contaminant in grain, sitona presents a local problem. Previous work showed that 8 ppm maldison was toxic to sitona adults, but as much of our export grain has only 2-3 ppm maldison at the time of export, information was required on the toxicity of low concentrations.

Although the results were not conclusive because of high natural mortalities, trials indicated that levels of 5 ppm maldison are probably required to kill adults.

## 2.6 Pesticide residue investigations - Y.P. Lim (resigned), R.B. Jenins

The phasing out of DDT has continued to the stage where there are now only three major and seven minor broad acre uses of DDT. These are, however, the most difficult problems.

### 2.6.1 Heliothis in field peas

1972 trials indicated that it is unlikely that endosulfan could be used at less than 350 g/ha, and even that rate would need testing against heavy infestations. A series of commercial trials with endosulfan is planned for 1973. A preliminary investigation indicated that some crops are sprayed for uneconomic infestations.

### 2.6.2 Heliothis in lucerne

Endosulfan at rates as low as 210 g/ha were found to be effective. Even lower rates may be worthwhile evaluating.

### 2.6.3 Persectonia in pastures

Analysis of 1971 trials further endorsed the effectiveness of 420 gm/ha trichlorophon and suggested that 350 g/ha endosulfan was another alternative substitute for DDT.

### 2.6.4 Bruchus pisorum (pea weevil) in field peas

A trial at Northfield indicated that rates of application of endosulfan could be reduced from 350 g/ha to 210 g/ha but this would need testing under heavier infestation conditions.

### 2.6.5 Pesticides in fauna

Fauna samples from 32 square kilometres at Saddleworth, selected for relatively high DDT usage (454 g ppi per hectare over 3% of the area each year) showed higher residues in birds than expected. The highest level was in the house sparrow and contrary to expectations, not in predatory birds. As the use of DDT on peas should be superseded in the very near future, fauna residue levels will be important information in extension programmes.

### 3. INSECT PEST SURVEY & CONTROL PROGRAMMES:

#### 3.1 Grain pests - P.R. Birks, C. Phillips

A survey of grain storage and infestation problems on 91 farms was conducted in association with district agronomists. Infestation occurred on practically all farms, with moderate to heavy infestations on 70% of farms. Grain spillage occurred on all farms and grain residues were found in 57% of farm bins, 60% of harvesters, 41% of combines and seeders, 48% of elevators and augers and 33% of truck bins.

The most common insects found were granary weevil (on 40% of farms), rust red flour beetle (30%), saw-toothed grain beetle (29%), spider beetle (26%), flat grain beetle (16%) and lesser grain borer (15%).

Farms depend quite heavily on chemicals for grain pest control, 45% used maldison as a protectant, 22% used fumigants, mainly phosphine and 58% used maldison to treat premises. Very significant misuse of chemicals occurred on 20% of farms, e.g. using DDT as a rodent tracking powder, spraying the outside of grossly infested stacks with contact insecticides, and on two farms the use of high toxicity pesticides which could only be described as alarmingly dangerous.

From 59 tests, resistance to maldison was detected in ten. So far resistance has been established at 21 locations in ten different species.

#### 3.2 Plague grasshoppers - P.R. Birks, C. Phillips

Ultra low volume spray units, proved to be effective against plague grasshoppers in previous trials carried out by the Section, have now been made available to district councils at a nominal fee for control work. During the year they were made available to landowners who were encouraged to evaluate them.

Large numbers of grasshoppers hatched in September, 1972, especially in the Orroroo district, but because of exceptionally dry conditions, it was anticipated that most would fail to reach maturity. Late rains and prolonged cool weather however, permitted survival and some cereal cropping areas were invaded. Four ULV misters were made available and some 35 landowners used them to treat approximately 404 hectares of the densest infestations.



Resulting from that quite extensive and successful operation and from the threat of a similar recurrence again next year, a Grasshopper Control Committee of the Orroroo District Council was formed, with a view to instigating a concerted district attack next year. This will be the first such programme in South Australia.

### 3.3 Plague locusts - P.R. Birks, C. Phillips

The extent of the locust invasion of the agricultural and nearer pastoral areas during the autumn of 1972 was determined by surveys covering some 9,656 kilometres.

Dry weather during the winter and spring of 1972 resulted in spasmodic hatchings of locusts. By late October some bands of hoppers were noticed on Eyre Peninsula, especially near Cleve, and some serious damage to crops began. A field day demonstrating spraying techniques attracted approximately 100 people. Supplies of insecticide were made available to 25 district councils and some 3,642 hectares of the densest infestations were sprayed, mainly in the Cowell and Cleve area.

Yet another autumn invasion of locusts on Eyre Peninsula took place with night migrations mainly on the 11th and 12th April, 1973. The area affected covered the Kimba-Buckleboo to Mudamuckla region. The invasion is believed to have originated from the north, rather than the north east. Some swarm activity is expected from these areas in the spring.

## 4. EXTENSION ACTIVITIES:

During the year members of the Section addressed three Agricultural Bureau meetings, six Agricultural Bureau district conferences and one meeting of the C.S.I.R.O. State Advisory Committee. They gave seven radio talks, five field days and addressed three advisers' regional meetings. Written information was prepared for three Agricultural Bureau conferences. Assistance was given in organising a Plant Protection Training Conference and four papers and one demonstration were contributed by Section staff.

Other advisory and administrative activities included:-

- \* South Australian Pesticides and Advisory Committee:  
P.R. Birks
- \* Commonwealth and State Entomology Committee:  
P.R. Birks delegate; P.G. Allen observer

- \* Grain Infestation Expert Panel of the Commonwealth and States Entomology Committee:  
P.R. Birks
- \* Pesticide Summary Sub-committee of Commonwealth and States Entomology Committee: P.R. Birks
- \* Locust Sub-committee of Commonwealth and States Entomology Committee: P.R. Birks

Mr. P.G. Allen prepared and presented 20 of the 23 lectures in the Department of Further Education Pest Control Course during 1972.

#### 5. MINISTERIAL REPORTS:

During the year approximately 25 Ministerial reports were prepared. They mainly dealt with grasshopper and locust activity and reports on new pests and pest problems.

#### 6. DIAGNOSTIC SERVICES:

Specimen identification and advisory services were supplied to other Departmental officers, industry, farmers and the general public arising from some 750 phone calls received. Additional correspondence and identifications included 121 stored product samples involving 394 species determinations. Resistance tests were conducted on 59 samples, of these ten showed resistance.

Fruit fly identifications were undertaken for Horticulture Branch during early February, 1973.

#### 7. REGULATORY SERVICES:

Eighty submissions to the Technical Committee on Agricultural Chemicals were considered for clearance recommendations. Approximately 300 pesticide labels were considered for State registration.

#### 8. STAFF:

Mr. Y.P. Lim, Research Officer, resigned on 2nd March, 1973.

Messrs. P.R. Birks, P.G. Allen and Y.P. Lim attended the XIVth International Congress of Entomology in Canberra in August, 1972.

Mrs. J. Moulden, Messrs. C. Phillips and R.B. Jenkins attended the Plant Protection Training Conference in April, 1973.

Mrs. J. Moulden attended the Departmental Induction School at Roseworthy College in February, 1973 and has undertaken Entomology II at the Waite Agricultural Research Institute.

Mr. R.B. Jenkins resumed second year of the Science Technicians Certificate Course at the South Australian Institute of Technology in 1973.

Mr. P.G. Allen attended the Australian Institute of Agricultural Science Symposium on Land Use in the Adelaide Hills and is continuing his study of damage assessment in pasture cockchafer for the degree of Master of Agricultural Science.

#### 9. PUBLICATIONS:

"Summary of Crop and Pasture Pests Control Recommendations, 1973", Extension Bulletin No. 7.73.

Allen, P.G. (1973) - "Roden proofing farm storages". Jn. Agric. S. Aust. (in print)

Allen, P.G. (1973) - "Biology of Desiantha caudata Pasc. (Coleoptera:Curculionidae) in South Australia". Jn. Aust. Ent. Soc. (in print).

Moulden, Jane (1973) - "Biology of Sitona species with particular reference to S. humeralis". Agronomy Branch Report No. 44.

Lim, Y.P. - "Alternative to DDT for the control of climbing cutworm (Heliothis punctigera Wallengr.).

"Alternatives to DDT for the control of pea weevil (Bruchus pisorum (L.)) in field peas. Agronomy Branch Report (in print).

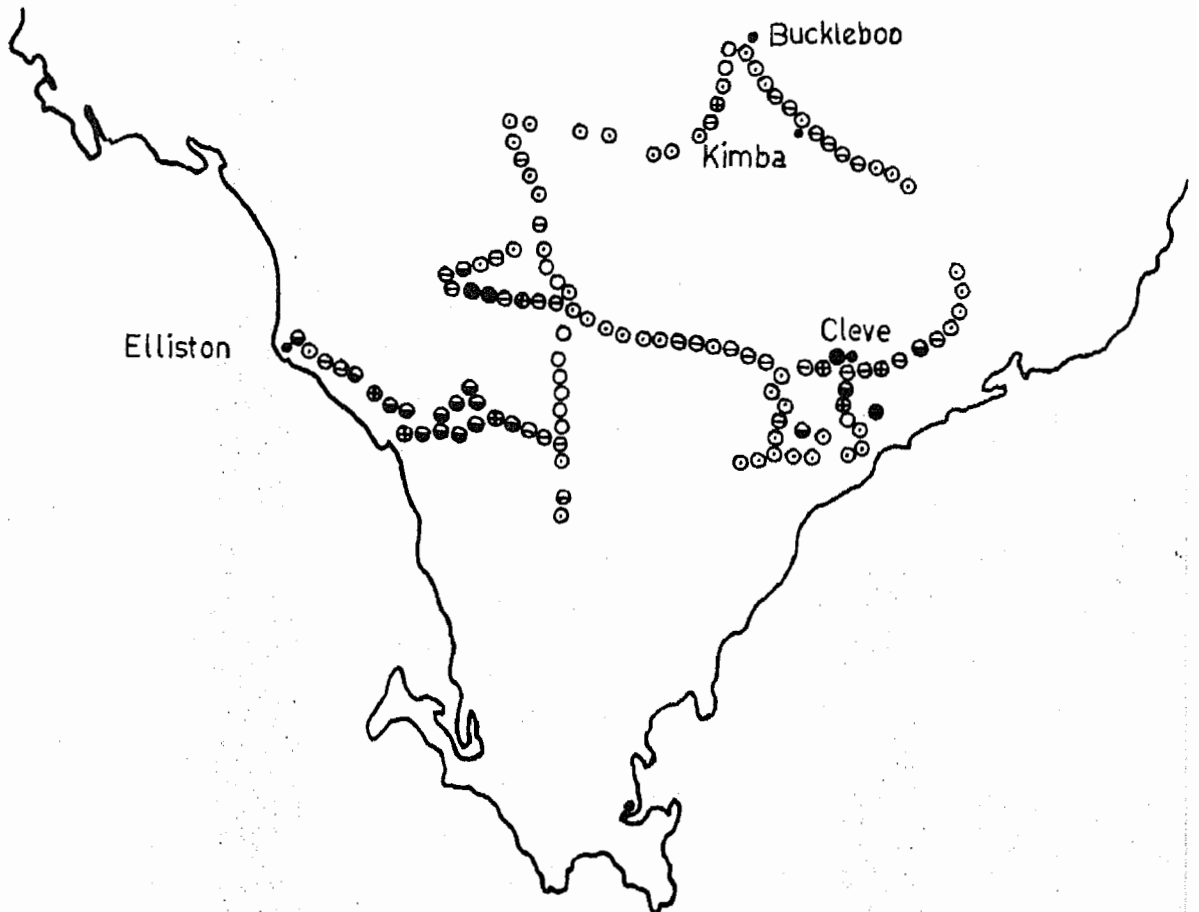
Lime, Y.P. & Birks, P.R. - A survey of pesticides in fauna in the Saddleworth-Riverton area, 1972. Agronomy Branch Report (in print).

# PLAGUE LOCUST SURVEY

March 1972

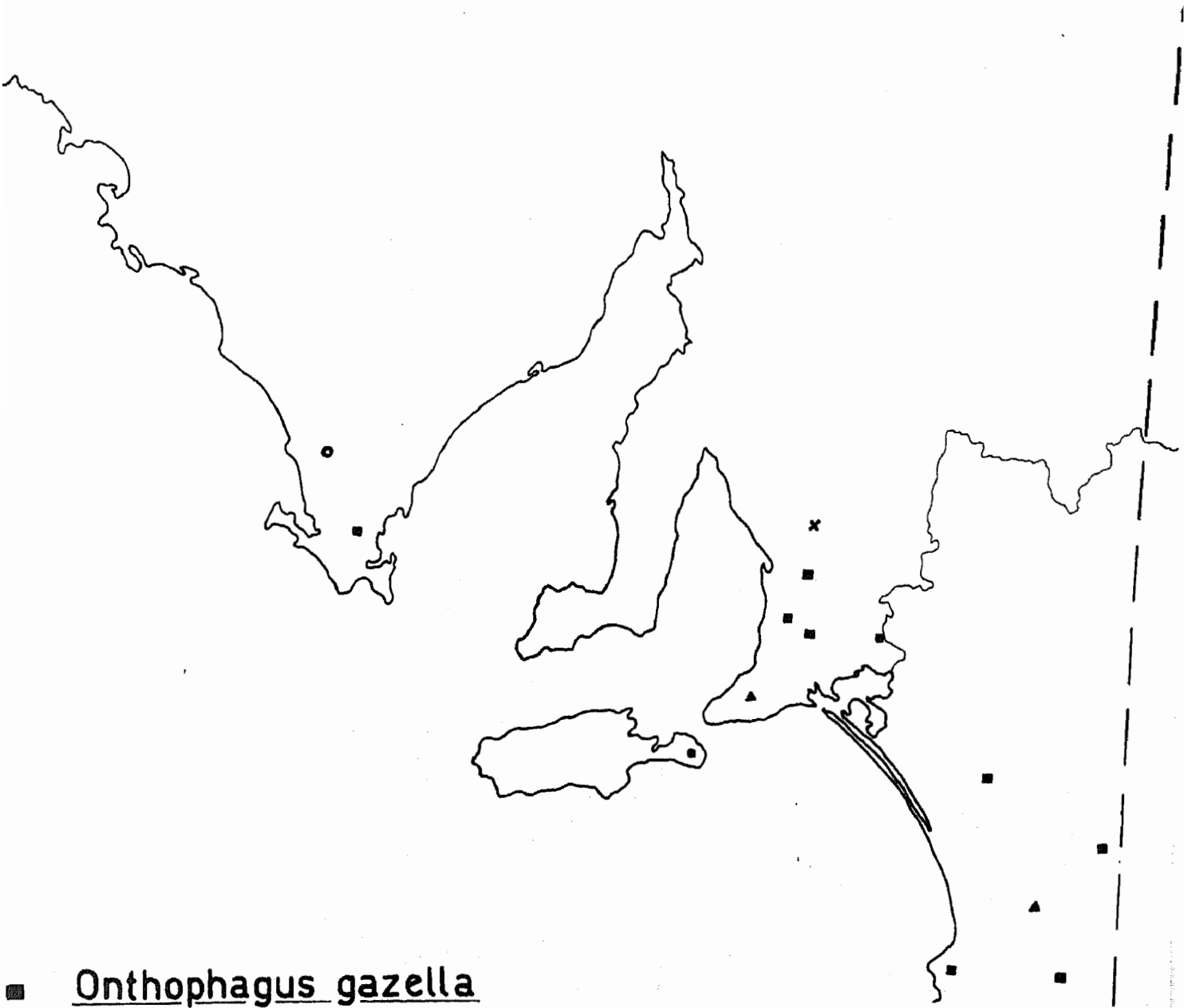
## Key to locust densities

- nil
- 1-5 per 100 sq yds
- 5-50 per 100 sq yds
- 50-100 per 100 sq yds
- 100-200 per 100 sq yds
- > 200 per 100 sq yds



# DUNG BEETLE RELEASES IN S. AUST.

( as at June 1973 )



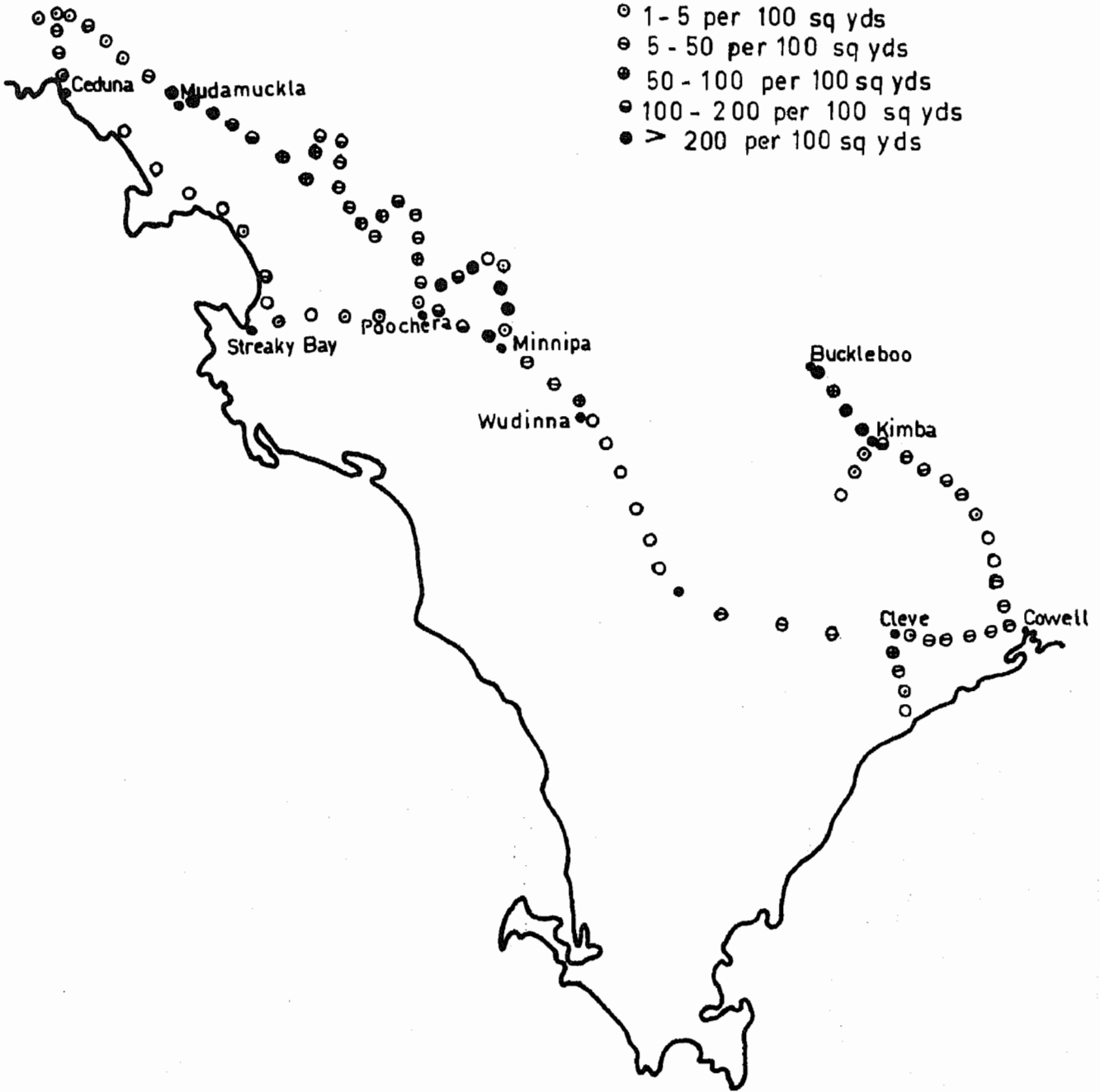
- *Onthophagus gazella*
- ▲ *O. binodis*
- x *Onitus alexis*
- *Euoniticellus africanus*

PLAGUE LOCUST SURVEY.

May 1973

Key to locust densities

- nil
- ◌ 1- 5 per 100 sq yds
- ◌ 5- 50 per 100 sq yds
- ◌ 50- 100 per 100 sq yds
- ◌ 100- 200 per 100 sq yds
- > 200 per 100 sq yds

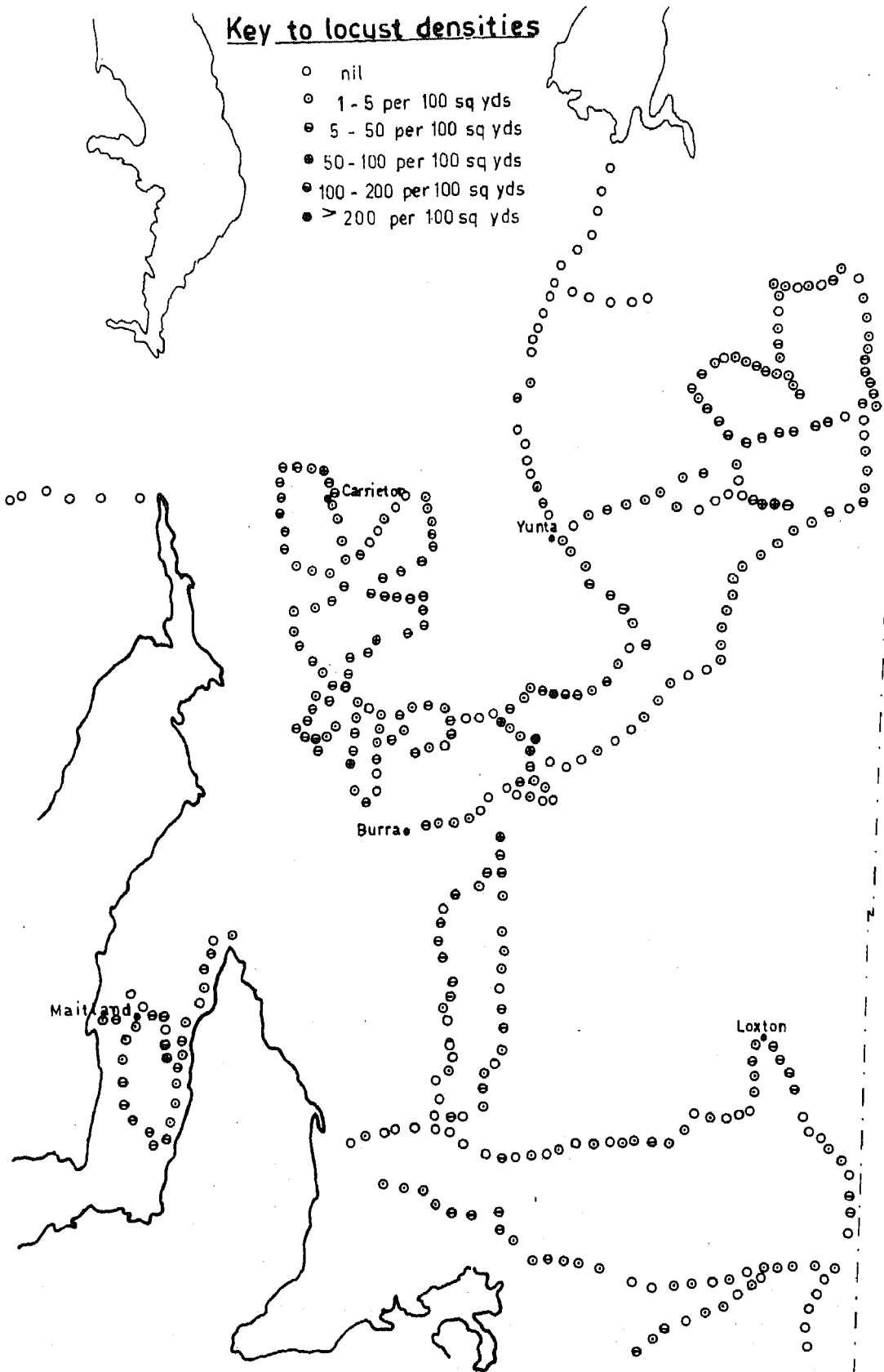


PLAGUE LOCUST SURVEY.

March 1972

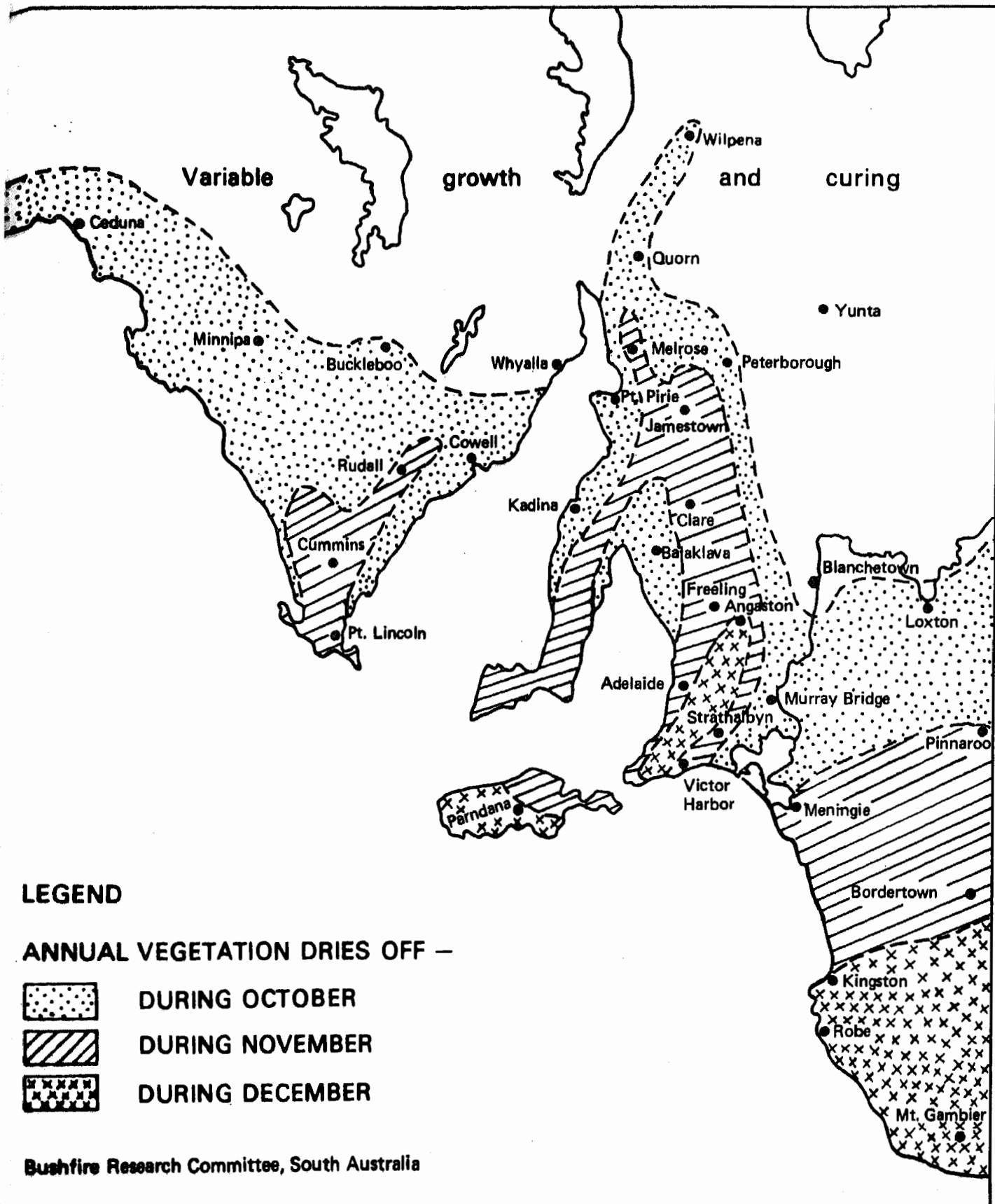
Key to locust densities

- nil
- 1 - 5 per 100 sq yds
- 5 - 50 per 100 sq yds
- 50 - 100 per 100 sq yds
- 100 - 200 per 100 sq yds
- > 200 per 100 sq yds



# CURING ZONES - ANNUAL VEGETATION

(AVERAGE YEAR)





PASTURE UTILISATION SECTION

SECTION LEADER:

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

SENIOR RESEARCH OFFICER:

Mr. M.V. Smith, M.Ag.Sc. (study leave)

RESEARCH OFFICER:

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

FIELD ASSISTANT:

Mr. A.D. Murray

## PASTURE UTILISATION SECTION

### 1. SECTION ACTIVITIES:

The Pasture Utilisation Section brings together the research scientists concerned with pasture ecology, the interactions between soils, pastures and grazing animals. The long term philosophy of the Section is to gain knowledge and understanding of the relationships between animal productivity and the environment.

Work on assessing the potential production of pastures in the high 550 mm annual rainfall areas was continued. It has been calculated that the potential is far greater than the actual productivity, and the reasons for this difference are being sought. Extended periods of low mineral nitrogen availability and low leaf area of grazed pastures seem to be the major current limitations to yield.

Another important environmental restriction to productivity is low winter temperatures. Work in the Section reported last year has shown that it is only at low leaf areas that the growth of subterranean clover swards is restricted by low temperature. This important discovery significantly increases the potential productivity of the high rainfall districts; and the likelihood of introducing new fertiliser and management practices.

The evaluation of new herbage plant cultivars under grazing is continuing. The Kangaroo Island experiment, rainfall 600 mm, has shown that a recommended cultivar, Victorian perennial ryegrass, fails at all stocking rates to persist after the third summer from sowing, confirming earlier observations in other experiments. A second experiment, at Mt. Alma, a high rainfall, approximately 850 mm, site in the Mt. Lofty Ranges, has been sown to compare a local perennial ryegrass ecotype with Tall fescue cv. Demeter.

### 2. RESEARCH PROJECTS:

#### 2.1 Productivity of a grazed pasture at Kybybolite - P.S. Cocks

Herbage growth, soil mineral nitrogen, plant nitrogen and botanical composition of a grazed pasture were determined on samples taken at intervals through the growing season. The rate of pasture growth varied from 15 kg/ha d<sup>-1</sup> in August to 100 kg/ha d<sup>-1</sup> in late October. Total annual production was 12,000 kg/ha.

Soil mineral nitrogen was plentiful for about one month after the opening of the season. Thereafter all nitrogen mineralised was rapidly taken up by the pasture. Nitrogen response experiments indicated that pasture growth was limited by low nitrogen throughout the year; total growth with nitrogen fertiliser was almost doubled ( $23,000 \text{ kg/ha}^{-1}$  compared with  $12,000 \text{ kg/ha}^{-1}$ ).

Subterranean clover growth was slowest in winter and fastest in spring. Compared to clover, capeweed (Arctotheca calendula) grew better in winter, and barley grass (Hordeum leporinum) better at all times except October and November. The pasture depended on soil nitrogen in winter, but legume nitrogen was important in the spring.

The total amount of nitrogen taken up by pasture plants during the growing season was  $292 \text{ kg/ha}^{-1}$ , of which  $176 \text{ kg/ha}^{-1}$  came from the soil through grasses and herbs, and  $116 \text{ kg/ha}^{-1}$  from legumes. Of the  $292 \text{ kg/ha}^{-1}$ ,  $214 \text{ kg/ha}^{-1}$  had been consumed by animals. It was estimated that for unrestricted growth the pasture needed  $700 \text{ kg/ha}^{-1}$ ; the estimated nitrogen deficiency was thus about  $400 \text{ kg/ha}^{-1}$ .

Low leaf area was also seen to be important in restricting growth throughout the year. The problems of increasing pasture growth when LAI does not exceed 2 are still to be resolved.

## 2.2 The response to nitrogen of three annual pasture species - P.S. Cocks

The responses of three annual pasture grasses to nitrogen fertiliser were studied at three densities. Total herbage and nitrogen uptake were measured at four harvest dates.

The three grasses varied in their response to nitrogen, depending on density. At low density both Lolium rigidum (Wimmera ryegrass) and Hordeum leporinum (barley grass) had greater dry weight increase than Vulpia myuros (silver grass). but at high density Vulpia responded as well as Lolium, and better than Hordeum. By comparing the nitrogen responses at similar values of available herbage it was seen that, over a wide range of availability, both Lolium and Vulpia had greater absolute response than Hordeum.

Hordeum absorbed more non-fertiliser nitrogen than the other species. However, both Lolium and Vulpia recovered more of the fertiliser nitrogen. Hordeum had more nitrogen in the leaves; this was true at low and high nitrogen, and low and high density.

It was concluded that nitrogen response will probably be greatest on swards of Lolium or Vulpia which have neither too much nor too little available herbage.

2.3 The influence of density and nitrogen on the outcome of competition between two annual pasture grasses - P.S. Cocks

The hypothesis that the outcome of competition between Hordeum leporinum (barley grass) and Lolium rigidum (Wimmera ryegrass) depended predominantly on the density of Hordeum was tested in two experiments. In the first experiment it was postulated that increasing density of Hordeum increased its competitive ability; in the second experiment the interaction between soil nitrogen and density was studied.

Under the conditions of the first experiment the hypothesis was shown to be true. The competitive ability of Hordeum was closely related to its density, and neither the density of Lolium nor the total density had a significant effect. Hordeum was most competitive when its density was highest.

The second experiment showed that soil nitrogen was an important modifying factor. At low nitrogen Hordeum was the successful competitor, but its competitive ability decreased with increase in its density. At high nitrogen Lolium became the successful competitor, but the effect of Hordeum density was similar to that in experiment 1. At the lower levels of nitrogen the density of Lolium also affected the outcome of competition, but its effect was never as great as that of the density of Hordeum.

2.4 Sulphur - coated urea as a source of nitrogen for pasture grasses in South Australia - D.J. Maschmedt, P.S. Cocks, A.L. Clarke

Pasture growth at Kybybolite (in the Lower South East) and in the Mt. Lofty Ranges, is limited by the amount of mineral nitrogen in the soil. This is likely to be true of other areas with similar climate.

Frequent dressings of conventional fertiliser nitrogen are needed to promote maximum pasture yield. Clearly a slow release nitrogen fertiliser that remains effective for several months after an autumn application is desirable.

Such a fertiliser is sulphur-coated urea (SCU) developed by the Tennessee Valley Authority. Granules of normal urea are coated with elemental sulphur and wax, thus reducing their

solubility. The effectiveness of this fertiliser is being tested at Kybybolite Research Centre, where frequent herbage samples are being harvested, and the amount of mineral nitrogen in the soil is being monitored following the use of this and more conventional nitrogen fertilisers.

2.5 Evaluation of five pasture types in terms of liveweight changes and wool production -  
P.R. Gibson

In many areas of South Australia existing pastures consist of sown or volunteer subterranean clover and volunteer annual species (Hordeum leporinum, Bromus rigidus and B. mollis, Vulpia myuros, Arctotheca calendula and Erodium species). There is controversy as to whether further progress in pasture productivity can be achieved by sowing a perennial grass cultivar.

A trial was established on Kangaroo Island during the autumn of 1970 to compare an existing pasture of annuals with several sown grasses. Sown grass cultivars were Victorian and Medea perennial ryegrass (Lolium perenne), Siro 1146 hybrid phalaris (Phalaris tuberosa X P. arundinacea) and Wimmera annual ryegrass (Lolium rigidum). The trial has been stocked since the beginning of 1971 with Merino wethers at a range of stocking rates. Liveweight, wool growth, wool quality, pasture productivity and the botanical composition of the pastures are being recorded.

2.5.1 The clover component in 1972 was high, particularly during the spring. This was in contrast to 1971 where adequate clover occurred only in the unsown treatment.

2.5.2 Under continuous grazing Medea perennial ryegrass out-yielded both Victorian perennial ryegrass and Wimmera ryegrass. The Victorian perennial ryegrass grew very poorly in autumn and winter, critical periods in the welfare of the sheep.

2.5.3 Barley grass (Hordeum leporinum) was a valuable grass during the autumn and winter growth periods. Pastures composed of barley grass and subterranean clover (the unsown treatment) gave the highest wool production.

2.5.4 Hybrid phalaris rapidly responded to late summer and autumn rains, resulting in increased sheep liveweights. However, after the seasonal break, growth was not fast enough (due to a low population of plants) to give weight gains as great as those given by the unsown treatment.

2.6 Evaluation of two perennial grass cultivars -  
P.R. Gibson

An experiment to compare weaner growth on three pasture types was established at Mt. Alma near Inman Valley, in the Mt. Lofty Ranges. The three pastures (subterranean clover, clover and Demeter tall fescue, clover and Mt. Alma perennial ryegrass) were sown in September, 1972. Unfortunately a poor establishment took place. The trial will be resown in the spring of 1973. It is intended to stock the trial with weaner polworth sheep and to measure the performance over the following twelve months.

3. STAFF:

Mr. P.G. Telfer, Field Assistant to Mr. P.R. Gibson, resigned. He was replaced by Mr. A.D. Murray.

Mr. M.V. Smith, Senior Research Officer, is on study leave at the University of New England, where he is studying for the degree of Master of Agricultural Economics. His project is entitled "Stochastic influences on the profitability of resowing rundown pastures with perennial species".

Mr. D.J. Maschmedt joined the Department early this year and is stationed at Kybybolite Research Centre.

Mr. P.R. Gibson attended the Third World Conference on Animal Production held in Melbourne.

4. PUBLICATIONS:

- Cocks, P.S. & Donald, C.M. (1973) - The germination and establishment of two annual pasture grasses (Hordeum leporinum Link) and Lolium rigidum Gaud.). Aust. J. Agric. Res., 24: 1-10.
- Cocks, P.S. & Donald, C.M. (1973) - The early vegetative growth of two annual pasture grasses (Hordeum leporinum Link and Lolium rigidum Gaud.). Aust. J. Agric. Res., 24, 11-19.
- Cocks, P.S. (1973) - The influence of temperature and density on the growth of communities of subterranean clover (Trifolium subterraneum L. cv. Mt. Barker). Aust. J. Agric. Res., 24, in press.
- Smith, M.V. (1972) - The ecology and utilisation of dryland lucerne pastures on deep sands in the Upper South East of South Australia. M.Ag.Sc. thesis, University of Adelaide.