



DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

Agronomy Branch Report

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PLANT BREEDING SECTION

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PLANT BREEDING SECTION

1. SECTION ACTIVITIES:

Previous to the 1972-73 period, plant breeding was grouped within the Pasture Research Section.

During the restructuring process leading to the creation of separate Plant Breeding and Plant Introduction Sections, a special meeting was held with Waite Agricultural Research Institute and C.S.I.R.O. Division of Plant Industry principals and personnel concerned with plant genetic resources, plant introduction, and plant breeding. The main areas of responsibility of each organisation and avenues for further co-operation were satisfactorily resolved at this meeting.

The principal aim of the research carried out by the Plant Breeding Section is to produce improved cultivars for Australian, especially South Australian, agriculture.

The research projects are concerned with improvement of three groups of herbage plants, annual medics for cereal areas, lucerne and other perennial Medicago species for dryland, irrigated and waterlogged situations and perennial grasses, especially tall fescue and ryegrass for high rainfall and irrigated areas.

The Section has its headquarters at the Northfield Research Laboratories and operates on the principle of evaluation of breeding material in the regions of principal use wherever practicable.

The annual medic and lucerne breeding projects receive major financial support from the wheat and wool industries respectively. During the year the State Wheat Research Committee and a special sub-committee of the Australian Wheat Research Council favourably reviewed the conduct of the annual medic breeding project.

As mentioned in the 1971-72 annual report, resistance to the sitona weevil, Sitona humeralis, has become another important objective in the annual medic and lucerne breeding programmes. Most of the collection of annual medics has now been screened for resistance to the adult weevil. Moderate levels of resistance have been discovered in several species and a crossing programme started. In Medicago truncatula (barrel medic), the levels of resistance found are considered unsatisfactory and an induced mutation programme has been commenced in collaboration with Drs. C.M. Francis and B.J. Quinlivan of the Western Australian Department of Agriculture. Natural populations of the insect declined

dramatically during and following the 1972 drought, so much so, that further large scale screening will not be possible until at least late in the spring of 1973.

In order to increase the efficiency of the preparation, collection and presentation of data from the Section's field experiments, it is proposed that as much routine bookkeeping as possible will be handled with the Public Service Board's ADP Centre computing facilities. In co-operation with the Senior Biometrician, Mr. J.V. Ellis, a start was made by adapting a wheat breeding system programme for use with the annual medic breeding project. The wheat programme had been developed over a long period by Dr. A.J. Rathjen at the Waite Institute. Further refinements will be made for routine use of this type of programme for the Section's projects.

New lucerne material brought from overseas must be placed in quarantine. This has necessarily delayed the lucerne breeding programme. In collaboration with the Western Australian Department of Agriculture, some lucerne quarantine has been undertaken in Perth pending the building of a quarantine glasshouse at Northfield. This glasshouse was commenced in June, 1973. Earlier material was quarantined in facilities loaned by the Waite Institute. The first hundred or so lines released from quarantine were grown under irrigation at the Northfield Laboratories during the 1972-73 summer. Seed was produced on these plants using large portable bee cages, miniature hives of honey bees, and the services of the Department's Apiary Section. Development of special sowing and harvesting equipment for field experimentation with this seed advanced well during the year.

The perennial grass breeding project is the most recently started project. In November, 1972 Messrs. Lawton and Mathison visited eastern states research stations, institutes and seed production areas concerned with the agronomy and breeding of temperate perennial grasses and annual medics. This not only helped establish rapport with interstate workers but also gave very valuable leads to improving the technology in both the tall fescue and annual medic breeding projects. One area which should benefit greatly is in the production of tall fescue seed for evaluation of both introduced populations and limited clone crosses. Nevertheless, enough seed was produced in 1972 from spatially separated groups of potted plants in the field to enable sowing about 40 lines in comparative sward experiments at Woodside in autumn, 1973.

Further details of routine research activities are described under the specific project headings.

As in previous years there were many local, overseas and interstate visitors. The types of visit ranged from addresses

given to groups of Agricultural Bureau members on half-day guided tours of the Northfield Laboratories to discussions between individual officers. Overseas visitors spending more than a day or so with the Section were Dr. Al Fakhri of Mosul University, Iraq, Mr. A. Heile from Ethiopia and Mr. S. Tounekti from Tunisia. Mr. Tounekti spent some weeks with the Section learning techniques for evaluating annual medics.

2. RESEARCH PROJECTS:

2.1 Breeding of Annual Medicago - M.J. Mathison, B.C. Bull, Mrs. S. McLean

2.1.1 Evaluation of introductions, parents & progeny

Improvements are being sought in winter herbage yield and seed and burr yield, re-establishment and wide adaptability to important Australian wheat belt environments. Assessments of annual medic introductions and bred material are made in swards sown at five localities chosen as representative of some of the most important of the South Australian environments. Sites used are near Lameroo, Mindarie, Northfield, Mundoora and Jamestown. About 250 introduced lines of M. truncatula, 50 lines of M. rugosa and 50 bulked F3 hybrid populations of M. truncatula are being assessed on their regeneration from 1971 sowings at each site. These lines were sown again at Northfield in 1972 as marked differences between years occur in the ranking of yield attributes of lines sown at this site.

The information from the M. rugosa lines complements that from experiments conducted at Parafield and Turretfield Centres by the Plant Introduction Section.

Useful variability exists in the attributes considered important and this material is being re-combined in further crossing programmes. As well, the best lines will be tested further in sowings in 1973 and 1974. In these sowings, 500 lines will be examined at each site. These include collections of M. scutellata, M. tornata and M. polymorpha, as well as further crossbreds from the breeding programme. There is special interest in these other species as there are lines of M. scutellata with moderate resistance to sitona weevil, M. tornata interbreeds with M. truncatula and may extend the range of usefulness on sand over clay (solodised solonetz) soils, and M. polymorpha performance information will complement a breeding programme conducted at the University of Western Australia. As there are thousands of plots at the test sites, the value of mechanisation and computered bookkeeping can be readily appreciated.

2.1.2 Screening annual *Medicago* species for resistance to adult *Sitona humeralis*

The sitona weevil became a serious pest of annual medics and lucernes in South Australia after the annual medic breeding programme had been conceived. It is realised that resistance to the insect is an essential attribute to good performance of any selections and that the resistance will be of most value if integrated with other control measures. Research into other control measures is described in the Entomology Section report. Many thousands of medic plants have been screened for resistance to feeding by the adult weevil. As already mentioned some degree of success has been achieved in finding a moderate level of resistance in several species of annual medics. The species with the most lines resistant are *M. rugosa*, *M. intertexta* and *M. scutellata*. There still remain some medic introductions to be screened. In *M. truncatula*, where most breeding effort is concentrated, as already mentioned more suitable resistance is still being sought. This is being done by attempting to induce mutants with resistance as well as seeking natural mutants among introductions and adapted cultivars.

2.1.3 Studies of the effect of fluctuating temperatures on changes of hard seed of medics

This work is associated with attempts to incorporate improved regeneration characteristics into the breeding programme. Some lines of *M. truncatula*, including several from Tunisia, were identified with better regeneration than cultivars in the field in 1972 and 1973. Seed of these lines has been produced under glasshouse, irrigated and natural rainfall conditions for further study with fluctuating temperature treatments. Some crosses have also been made and the progeny grown for further study of the inheritance of soft seed and hard seed response characteristics.

2.2 Breeding of Lucerne - I.D. Kaehne, C.S. Morner, Miss B. Martin

2.2.1 Lucerne introduction programme

The lucerne collection programme continued to expand and now includes more than 1,000 introductions, representing 16 species of perennial *Medicago*. As mentioned, quarantining of material was still only possible at other Australian institutes but will soon be done at Northfield. More than 500 lines have passed through quarantine.

2.2.2 Selection for high yield & persistence under irrigated & dryland conditions

Seed of many of the high yield lines already passed through quarantine was produced as mentioned using the special bee cages. This seed will be sown in comparative sward trials at Northfield.

2.2.3 Selections of lucerne for adaptation to waterlogged & poorly drained soils

Northern hemisphere cultivars claimed to be waterlogging resistant have been compared with Australian and other cultivars in pot experiments using three soil types, waterlogged and not waterlogged. Yield differences were not great under waterlogging, but the death rate was much lower among the northern European waterlogging resistant lines. These lines, however, in non-waterlogging situations are less winter active. Crosses made between the most winter active lines and the waterlogging resistant lines will be evaluated with their parents in further experiments.

2.2.4 Selection of lucerne for persistence under continuous grazing

Selected clones from 50 populations of perennial Medicago species differing in morphology, have been crossed with high-yielding clones to establish a broadly based population for selection.

2.2.5 Selection for disease resistance

Varieties having higher resistance than present commercial varieties to bacterial wilt, stem nematode and leaf and root pathogens, are being multiplied and crossed with commercial lines.

2.2.6 Selection for resistance to adult feeding by sitona weevil, *Sitona humeralis* Steph.

Seven commercial varieties and 17 introductions from the U.S.A. were screened. No resistant plants were found. Two tolerant plants from Hunter River and Rhizoma were detected.

2.3 Perennial Grass Breeding Programme - G.W. Lawton

This programme is aimed at increasing pasture productivity in the high rainfall (greater than 600 mm p.a.) and irrigated areas of the State, especially where lucerne is poorly adapted because of winter wetness. Genetic variation within the species

Lolium perenne L. (perennial ryegrass) and Festuca arundinacea Schreb. (tall fescue), will be exploited to advantage.

Introductions of both species are continuing to be assembled. Initially studies are being concentrated on tall fescue. The two broad objectives of these tall fescue studies are:-

- * To develop a persistent cultivar with a seasonal growth rhythm closely matching the needs of grazing animals in that the winter growing ability and drought tolerance of some Mediterranean ecotypes is combined in the one synthetic cultivar with the spring, summer and greater total yield potential of some temperate lines.
- * To develop a cultivar adapted to a more intensive form of agriculture than used at present. This would be one very responsive to nitrogen, resistant to frequent cutting and grazing and adapted to a monoculture situation. Under appropriate conditions tall fescue is known to have crop growth rate characteristics rarely matched by other species.

The collection has been compiled from as large a range of origins as possible so as to form a broad genetic base for the programme. Chromosome counts have been made to sort out the material into less divergent groups for facilitating hybridisation. As previously mentioned, enough seed of some lines has been produced to establish swards for initial field evaluation at Woodside in the Adelaide Hills.

Further seed of introduced populations for evaluation will be produced from clonal material in the field nursery and in pots. Crosses have already been made between some introductions and four polycross blocks set up in the nursery. The polycrosses are based respectively on the apparently most winter-active material, the most productive material, a combination of nine lines of the most winter active and most productive material, and on 16 lines from as wide a geographic representation as possible. The half-sib families within these polycrosses will form the basis for selection.

3. MINISTERIAL REPORTS & REGULATORY SERVICES:

Members of the Section were consulted on several occasions regarding Standing Committee and Agricultural Council matters, particularly in relation to national conferences, lucerne quarantine and introduction of leafcutter bees.

4. STAFF:

Mr. R. Britton transferred from the lucerne breeding project to a technical advisory position with the Weeds Section. Mr. C.S. Morner, who has had wide experience in plant breeding in Sweden, replaced Mr. Britton. Mr. Morner has been appointed as a field assistant pending assessment of his academic qualifications.

5. TRAINING:

Members of the Section have attended and taken part in a number of training conferences during the year. This included regular participation in pasture research group meetings at Northfield by Messrs. Kaehne, Lawton and Mathison; Agronomy Branch conferences on subterranean clover, oestrogenicity, kabatiella and plant protection, were attended by Messrs. Mathison, Bull and Morner, respectively.

Messrs. Lawton and Mathison spent a week in the South East studying pasture seed production and research with the Senior Research Officer (Pastures), Mr. Higgs. As already mentioned, these officers also undertook a two week interstate study tour.

6. PUBLICATIONS:

- Lawton, G.W. (1973) - Perennial grass breeding in South Australia. Australasian Plant Breeding and Genetics Newsletter No. 23, 84-86.
- Kaehne, I.D. (1973) - Lucerne varieties. In lucerne growing in South Australia. Dept. of Agric. S. Aust. Special Bull. No. 2, 73, 6-7.
- Kaehne, I.D. (1973) - Lucerne breeding in South Australia. Australasian Plant Breeding and Genetics Newsletter No. 23, 77-78.
- Mathison, M.J. (1973) - Resistance of annual Medicago species to sitona weevil. Australasian Plant Breeding and Genetics Newsletter No. 23, 75-77.

PLANT INTRODUCTION SECTION

SECTION LEADER:

Mr. E.J. Crawford, R.D.A.

PARAFIELD PLANT INTRODUCTION CENTRE:

Mr. B.G. Nankivell, R.D.A.

Mr. P.L. Blesing

Mr. L.K. Ramsay

Mr. S.H. Kelly

Mr. K.S. Roberts

Mr. W.R. Porter

PLANT INTRODUCTION SECTION

1. SECTION ACTIVITIES:

The plant introduction activities are centred at the Northfield Research Laboratories with the field station at Parafield, a northern suburb of Adelaide.

The Section, in conjunction with the Plant Breeding Section, has gained wide recognition for the development and maintenance of a medic "gene pool", possibly the most comprehensive in the world with lines of all 28 currently recognised annual species gathered from 53 countries.

Although the majority have been collected in countries bordering the Mediterranean Sea, genotypes have been collected from as far afield as India in the East and Chile in the Southern Hemisphere.

The major activity conducted by the Section during 1972-73 has been the continuance of the classification of the various lines of the annual species of Medicago.

Sward trials established in 1971 to compare the seasonal herbage production, seed production, subsequent regeneration and winter production of fifty lines of Medicago rugosa with existing cultivars, has been continued.

As a result of earlier successes with pilot plot sowing of Ghor barrel medic, the earliest flowering line of M. truncaluta on Eyre Peninsula, three replicated trials have been sown to compare its performance with cultivars currently being recommended for the less than 300 mm rainfall regions.

The main ability of Ghor is its ability to flower as much as four weeks earlier than other early cultivars. This could assure better seed set when the growing season is very short.

Following a large screening trial on annual legumes to determine their tolerance or resistance to "clover scorch", a fungus disease caused by the fungus, Kabatiella caulivora in 1972, a further sowing of 75 lines was made on Kangaroo Island this year.

Seed supplies of 537 lines of annual Medicago and 9 Astragalus species were increased in the field whilst 257 lines of numerous species were grown in the glasshouse and shadehouse for positive identification and further seed increase for future work.

2. RESEARCH PROJECTS:

2.1 Indexing of introduced plants - E.J. Crawford

An index is maintained of herbage seed introduced into South Australia. This seed may come from interstate or overseas organisations or may be the result of deliberate seed collecting expeditions.

Although many species are introduced into the State in the general plant introduction programme, most emphasis is placed on those species of known economic importance to our agriculture. These include annual and perennial Medicago species, annual Trifolium species and species of the grass genera Dactylis, Lolium, Festuca and Phalaris.

Viable seed supplies are maintained for future evaluation under pasture sward conditions as well as being a source of genetic variability for plant breeders and agronomists.

This index also includes selections made within the current plant introduction programme.

Close collaboration is maintained with the Division of Plant Industry of C.S.I.R.O. and the majority of introductions are also indexed under the Commonwealth Plant Introduction index.

During the current year, 665 genotypes have been indexed, bringing the total to 8,172 lines.

2.2 Classification of annual species of Medicago - E.J. Crawford

Over the last five years the most comprehensive collection possible of annual species of the genus, Medicago, has been assembled for classification and evaluation.

As the annual medic is the most widely adapted legume in South Australia's agriculture, both the morphological and agronomic features are recorded on spaced plants.

A total of 536 lines have been dealt with in the year currently under review. From this collection an additional 282 selections were made for variable morphological or agronomic characteristics.

The total lines classified is now over 3,600 from about 50 countries.

The three major groups in 1972 were M. orbicularis (81), M. polymorpha (78) and M. truncatula (75), respectively.

Although the lines were representative of 31 countries, the majority, 24% were received from Tunisia and 18% from Israel with lesser numbers from other countries.

One significant finding was a line of M. intertextata v. ciliaris which flowered 25 days earlier than previously observed accessions of the species. This line, viz. C.P.I. 44186, was collected from a poorly drained, saline area between Haifa and Acre, Israel.

This line flowered as early as M. truncatula cv Ghor, previously the earliest flowering annual medic cultivar known.

The earliest flowering genotype recorded to date is a line of M. polymorpha from Chile, which flowered 4 days earlier than Ghor.

Seedling vigour of the various groups varied considerably. None of the M. orbicularis lines had better seedling vigour than the M. truncatula cultivar, Jemalong.

Of the M. truncatula group, 5 were better than Jemalong, these being 3 lines from Israel, the standard seedling vigour control from Algeria and the Australian registered cultivar, Cyfield.

None of the M. polymorpha lines had better seedling vigour than Jemalong although nearly all expressed better spring growth.

All except three of the 43 M. intertextata lines exhibited better seedling vigour than Jemalong. Several doubled the herbage production of Jemalong by late August.

Below average October rainfall only adversely affected the seed production of the very late maturing lines.

Tests to compare changes in seed coat permeability were conducted over the summer-autumn period on all lines with sufficient pod material.

This data along with the comprehensive record of morphological and agronomic characteristics is being prepared for computer storage and sorting and will be available to interested plant breeders and agronomists.

2.3 Sward trial evaluation of the *M. rugosa* group - E.J. Crawford

Two trials were sown in 1971 to compare relative establishment, seasonal herbage production, seed production, natural regeneration and subsequent winter production of 50 lines of *M. rugosa* with that of Paragosa gama medic, Borung and Jemalong barrel medics, one unregistered commercial line of *M. polymorpha* and Clare subterranean clover.

These trials were established on:-

- * A slightly acid red brown earth at Parafield Plant Introduction Centre.
- * An alkaline self-mulching grey clay loam at Turretfield Research Centre.

Interim results are as follows:-

2.3.1 Establishment

At Parafield, one accession established better than the mean of the experiment whilst at Turretfield four established better at the 5% level of significance.

2.3.2 Annual dry matter production

One sample was taken at the maximum growth stage in November, 1971. At Parafield, *M. polymorpha* was the only line to significantly exceed the mean yield of the experiment whilst at Turretfield, six *M. rugosa* lines exceeded the mean at the 5% level.

Of these six, four originated from Greece, one from Israel and one from Portugal.

2.3.3 Seed production

At Parafield, six *M. rugosa* lines plus *M. polymorpha* significantly out-yielded the mean of the experiment but only *M. polymorpha* out-yielded the control cultivar, Paragosa.

At Turretfield, 13 lines plus *M. polymorpha*, significantly out-yielded the mean of the experiment, 2 out-yielding the cultivar Paragosa at the 5% level.

2.3.4 Natural regeneration

Rainfall of 22 mm in mid-February followed by a further 11 mm within seven days, resulted in a partial germination at Parafield. Many seedlings died before the next useful rain of 30 mm during the third week in April. Exceptionally dry conditions prevailed during the next seven week period resulting in little growth from the surviving seedlings.

Plant population counts preceded useful rainfall at the end of June revealing significantly better regeneration of 18 lines, including the cultivars, Paragosa and Borung.

Twenty-three wet days in July resulted in 61 mm of rain and a secondary germination.

Further plant population counts revealed a further seven lines, including M. polymorpha, which had regenerated better than the mean at the 5% level.

The outstanding absolute plant population at this stage was that of M. polymorpha with greater than 8,000 plants per M², whilst the best M. rugosa lines was one Italian and one Greek line greater than 3,000 per M².

At Turretfield, the onset of a late autumn mouse plague resulted in considerable removal of pod material throwing doubt on the value of plant population counts resulting from germination rains of 25 mm in the third week in April.

However, plant population counts were made on 17 accessions to compare with the pattern emerging from the Parafield trial.

As a result of this, M. polymorpha was found to be significantly superior to all other accessions whilst only one M. rugosa accession was better than the mean at the 5% level.

2.3.5 Subsequent dry matter production

The absence of late autumn-early winter rainfall resulted in slow growth. However, dry matter production was measured at three weekly intervals from early mid-August.

At Parafield by early August, 18 accessions including the cultivars, Paragosa and Clare and M. polymorpha, significantly exceeded the mean at the 5% level. However, none significantly out-yielded Paragosa.

Recovery of 14 of the above 18 accessions was good with yields significantly greater than the mean within three weeks.

An additional three accessions, including Borung, also out-yielded the mean.

Again none significantly out-yielded Paragosa.

Recovery over the following three weeks showed that 13 of the same 14 accessions again significantly out-yielded the mean, Clare being the only line significantly superior to Paragosa.

The sum of the three harvests revealed that 22 of the accessions, including Paragosa, Borung and Clare and M. polymorpha, significantly out-yielded the mean but none significantly out-yielded Paragosa at the 5% level.

At Turretfield only the 17 previously mentioned accessions were sampled to compare with results achieved at Parafield.

At the mid-August harvest, 6 lines including Paragosa and Clare and M. polymorpha significantly out-yielded the mean, one out-yielding Paragosa at the 5% level.

There were no significant differences at the second harvest whilst the same abovementioned 6 accessions and two additional ones out-yielded the mean by the end of September, none out-yielding Paragosa.

The sum of the three harvests revealed the superiority of the same 6 accessions plus one other over and above the mean but none out-yielded Paragosa at the 5% level.

2.3.6 Inter-site relationship

Of the 10 top yielding accessions at Parafield, 9 also occupied the top yielding positions at Turretfield. These 9 included the cultivars, Clare and Paragosa and M. polymorpha, 4 of the M. rugosa accessions originating from Portugal, one from Italy and one from Greece, respectively.

Two of the top seed yielding lines plus M. polymorpha at Parafield were also in the 7 top yielding lines at Turretfield. These both originated from Greece.

Natural regeneration and seasonal herbage production will be measured on the Parafield site in 1973.

2.4 Sward evaluation of Ghor barrel medic -
E.J. Crawford, P.M.S. Potter, etc.

Following pilot trials on Eyre Peninsula in 1971 and 1972, three replicated sward trials were sown at Madamuckla, Pygery and Buckleboo respectively, all in the 275 mm rainfall region.

The aim of these trials is to compare the establishment, seed production, natural regeneration and subsequent winter dry matter production of Ghor barrel medic with the early maturing cultivars, Cyprus barrel and Harbinger strand medics, respectively and to establish whether the exceptionally early flowering genotype, Ghor, has a significant superior yield potential to the currently recommended cultivars in such low rainfall environments.

2.5 Screening annual legumes for resistance to clover
scorch caused by the fungus, Kabatiella caulivora -
E.J. Crawford, P. Beale

Of the 376 accessions of leguminous plants screened in the field at Kangaroo Island in 1972, 84 showed no symptoms of K. caulivora.

The incidence of K. caulivora was low in 1972 and many of the apparently tolerant accessions which also showed relatively good winter vigour and tolerance to waterlogging were selected for resowing in 1973. As a result of this selection and the further introduction of new material, 75 lines were resown for screening in 1973.

2.6 Seed production & exchange - E.J. Crawford

The ever increasing demand for pure seed samples for local use and overseas and interstate exchange purposes has resulted in an extensive seed production programme this year.

537 lines of annual Medicago species are being multiplied. Seed of a further 257 lines of less well known species have been grown in the glasshouse and shadehouse for positive identification and seed increase.

During the year, 660 seed samples of numerous species were despatched to overseas, interstate and local organisations for various research programmes.

3. EXTENSION ACTIVITIES:

During the year contributions and visits, either at Northfield Laboratories, Parafield Plant Introduction Centre or in regional districts throughout the State, were made and time devoted to the following activities:-

* Conferences	2
* Bureaux	3
* Seminars	4
* Student visits	4
* Interstate visitors	6
* Overseas visitors	11
* Meetings with interstate organisations	3

PLANT PATHOLOGY SECTION

SECTION LEADER:

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TECHNICAL ASSISTANT:

Mrs. C. Rix

PLANT PATHOLOGY SECTION

1. SECTION ACTIVITIES:

This year the Plant Pathology Section has been involved in a wide diversity of services as well as research activities, these are outlined in detail in other sections of the report.

The highlights of the year have been several small workshop conferences at which our research officers have been able to see how their work fits in with that being done interstate. They were fortunate to have their projects criticised and assessed by pathologists working in the same fields.

Of all the diseases reported this year, lucerne diseases appeared to be the most serious. Hay cuts on some irrigated crops were reduced drastically with the wilting and subsequent dying off of plants. Surveys showed that crown and root rotting was causing the decline, in some cases Rhizoctonia solani was the major pathogen implicated.

The Section has established good liaison with the industries with which our research is involved, namely the barley industry and the cereal seed dressing industry. By providing services to the cereal seed dressing industry the Section has become more aware of the problems facing the industry, the specific requirements they have for seed dressings and the problems farmers face in handling these materials.

Being a newly established Section, considerable effort has been made to get basic equipment and basic reference books which now allows effective operation.

A plant pathology course was developed for the Department of Further Education; this and the afore-mentioned projects illustrate the diversity of the services in which the Section is engaged.

2. RESEARCH PROJECTS:

2.1 Barley leaf scald (Rhynchosporium secalis) - A.H. Mayfield

Three aspects of the work are being pursued; they are crop loss assessment, resistance screening and survival.

2.1.1 Effect of leaf scald on the yield and quality of barley

In field trials at Northfield in 1972 plots of Clipper barley were sprayed with Mancozeb to control leaf scald. Other plots were left unsprayed. The disease level in the unsprayed plots was low and there were no consistent yield or quality differences between sprayed and unsprayed plots. These trials are being repeated in 1973 at Northfield, Turretfield Research Centre and the Mortlock Research Centre near Mintaro.

2.1.2 Screening for resistance to leaf scald

Thirteen hundred and thirty lines are being screened for resistance to leaf scald in the field at Roseworthy Agricultural College. The material consists of F3 lines of resistant parents and the backcross of resistant parents with Clipper and Dampier. The trial is a co-operative project involving Drs. W.J.R. Boyd and S.M. Ali (University of Western Australia), Dr. B.G. Clare (Waite Agricultural Research Institute) and personnel from the Plant Pathology Section. Drs. Boyd and Ali supplied the material and will assist with the screening. The results will indicate what material is suitable for future barley breeding work for varieties that are resistant to leaf scald and are commercially acceptable in South Australia.

2.1.3 Survival of *Rhynchosporium secalis* in barley debris

Field experiments designed to measure the survival of *Rhynchosporium secalis* over summer in barley leaves were started in December, 1971 and repeated the following summer. Diseased leaves were placed on the soil surface and pinned down with pieces of nylon mesh. Samples were taken every three weeks, washed, and the washings sprayed onto barley seedlings. In both years the seedlings were infected from material kept in the field for up to seven months. The results were similar for all sites (Adelaide, Aldinga, Karoonda and Arthurton).

In a separate experiment at the same time and same sites infected barley leaves were placed in nylon mesh bags 30 cm above the soil surface, on the surface and buried 6 cm below the soil surface. The infectivity of the material was measured by growing barley seedlings through the leaves spread over the surface of soil in pots. No infected plants were obtained from the buried material after five months in the field nor from the material on the soil surface after six

months in the field. The material above the soil surface after seven months in the field was still able to infect barley seedlings.

2.2 Clover leaf scorch (Kabatiella caulivora) - Miss J. Johnsson

The initial emphasis on this research programme was to screen annual legumes for resistance to K. caulivora. Two hundred and fifty two lines of fifty five Trifolium species ten Lotus species and six other genera have been screened. All Lotus, Onobrychis, Ornithopus and Segurigera species tested were not affected by K. caulivora. However, K. caulivora was able to infect all Trifolium species tested.

Aerial photography was attempted to study the spread of the disease. Under low infection conditions the disease is difficult to detect from photographs. This was further complicated by the different pasture species.

Other research being conducted is on the following aspects:- nutrient requirements for spore germination, histology of infection and disease development in Yarloop, the tolerance levels of different clover to different levels of disease, race determination, and the development of a biological assay for the testing of the infectivity of clover debris.

Miss Johnsson is working in association with Mr. P. Beale on the Parndana Research Centre on Kangaroo Island. Their programme involves the field screening of promising lines of Trifolium species, testing of fungicides and cultural practices on K. caulivora.

2.3 Annual ryegrass toxicity (a complex of a nematode (Anguina species) and a bacterium (Corynebacterium sp.)

This experiment is designed to find the best cultural method to control the disease, and is being run in association with Mr. Michelmore (District Agronomist). Sites were chosen at Tothill Creek and Farrell Flat and the various treatments applied in spray and summer of 1972. The treatments are aimed at breaking the life cycle of the nematode. The treatments are fallow, normal grazing, hard grazing, desiccant spraying and burning. The most effective treatment was burning followed by fallowing and hard grazing, spraying and normal grazing being least effective. This year both sites and all treatments except the controls will be cropped. Next year the whole experiment will revert to pasture and will be assessed for toxicity.

2.4 Stem nematode of lucerne (*Ditylenchus dipsaci*)

Dr. A. Dube, Assistant Mrs. C. Rix

The host range of the nematode is being investigated to assist advisers in suggesting suitable rotation crops.

In collaboration with the lucerne breeder, Mr. I. Kaehne, resistance of some lucerne cultivars to stem nematode is being assessed.

2.5 Bunt of wheat (*Tilletia foetida*) and covered smut of barley - Dr. A. Dube

This research is being done in association with Mr. Heard and Mr. Marshall of the Crop Agronomy Section. The experiment designed to determine dosage response curves of the best available smuticides failed. There was no infection by *Tilletia foetida* or *Ustilago hordei* despite the high viability of the material. Checks on the viability of spores of inoculated seed after sowing also show high viability. This would indicate environmental conditions during infection were unfavourable. The experiments will be repeated during the 1973 season, the only modification being from information obtained from other researchers interstate.

2.6 Cereal cyst nematode (*Heterodera avenae*)

Dr. A. Dube - Assistant, Mrs. C. Rix

From the field testing of twenty of the most resistant varieties of barley, four were chosen for laboratory testing. Laboratory testing has not been successful because of poor inoculation methods and subsequent low levels of infection.

These laboratory tests are being repeated this year as well as a further field testing of the twenty most resistant varieties at another site.

3. EXTENSION SERVICES:

The Section's major research activities are on diseases of barley. To make farmers aware of this the Section has made a display which is exhibited in the Barley Board pavilion at the Royal Show.

In association with Mr. A. Michelmore, a successful field day was held on annual ryegrass toxicity at one of the experimental sites; about one hundred farmers attended.

The following are the press releases made by the Section:- "New cereal seed dressings", "A new bunticide released", "A new breed of bunticides", "Another new bunticide registered" and "A new lucerne disease discovered".

The Section also assisted in the rewriting of the lucerne extension bulletin.

4. SURVEYS:

4.1 Crown and root rots of lucerne

During the summer months several serious reports of lucerne wilting and dying were received from lucerne growing areas along the River Murray. On three properties irrigation of lucerne was stopped because it was considered to be an uneconomic operation. A survey of the lucerne growing areas along the River showed that most properties had problems with crown and root rotting. Isolations from samples from these properties showed that Rhizoctonia solani was the major pathogen on some properties; other pathogens observed were Fusarium sp. and root knot nematode.

4.2 Stem nematode of lucerne (Ditylenchus dipsaci)

Following the discovery of stem nematode of lucerne at Langhorne Creek, a survey of the surrounding district was made; seventeen of the thirty-four properties visited had the disease on lucerne. The disease has probably been distributed by the unique method of flood irrigation that occurs in the area. Further spread of the disease occurs within paddocks by sprinkler irrigation. Stem nematode in this area is characterised by white flagging of shoots in winter and spring. The discovery of stem nematode of lucerne makes the entry of bacteria more serious as the nematode transmits the disease.

4.3 Bunt of wheat (Tilletia foetida)

Inspection of four hundred representative samples of hard and F.A.Q. wheat from the South Australian silo system revealed only one sample of bunt. This sample was received in an area where HCB resistance was noted.

5. SERVICES:

5.1 Disease identification

During the year 1972-73, one hundred and thirty one specimens were identified. Some new recordings were made for

pathogens on particular hosts in South Australia. Ditylenchus dipsaci was recorded on oats at Northfield and on lucerne at Langhorne Creek. The fungus, Phomopsis rossiana, involved in producing "Lupinosis" in sheep was found on Eyre Peninsula by Mr. P.M. Wood of the Western Australian Department of Agriculture.

5.2 Quarantine

Approximately 1,500 lucerne plants from Germany are being quarantined prior to their release to the seed growers. These plants are being brought into Australia under the O.E.C.D. seed multiplication scheme.

The annual medic introductions were inspected at the Parafield Plant Introduction Centre.

At the request of the Assistant Director of Health (Plant Quarantine), investigations were made into whether the present quarantine laws on lucerne could be relaxed. The investigations showed it would be unwise to relax quarantine regulations on lucerne because of the likely introduction of bacterial wilt. This disease would cause havoc in lucerne in wetter areas and in irrigated lucerne.

6. CONFERENCES & SEMINARS:

The Section was involved in the first small technical Agronomy Branch conference conducted by the Branch. The conference, held on Kangaroo Island, was on clover leaf scorch and clover disease in sheep. The papers presented by the Section were on "A survey on Kangaroo Island for Kabatiella caulivora", "The biology of Kabatiella caulivora", and "Resistance testing of annual legumes to Kabatiella caulivora".

In February, three small workshops were held. The first and last were held in association with the Plant Pathology Department of the Waite Agricultural Research Institute. The first conference was on Kabatiella caulivora, and representatives from the Australian Capital Territory, Victoria and Western Australia attended. The aim of this workshop was to find out what was known about the distribution, hosts, epidemiology and control of the disease. Research programmes were discussed to prevent over-lapping of work and to encourage co-ordination. Miss Johnsson presented her results and her future programme.

At the request of the Western Australian Department of Agriculture, a small workshop was convened on the annual ryegrass toxicity problem. This problem has recently been

discovered in Western Australia, and the Western Australian Department of Agriculture was interested to determine what research and what control measures had been developed. Dr. Dube presented the current results of the field experiments.

An informal workshop was conducted on barley leaf scald (Rhynchosporium secalis) to continue co-ordination of research programmes of the South Australian Department of Agriculture, Waite Agricultural Research Institute and the University of Western Australia. Mr. Mayfield presented his results on survival studies, crop loss assessment and future research programmes. He also attended the Barley Improvement Technical Conference held in Melbourne and presented a summary of work being conducted by the Section on barley. In April, Mr. Mayfield presented a paper on "The use of resistance in the control of plant pathogens" to a technical conference on "Pesticides, Problems and Progress".

Dr. Dube gave a seminar to the Plant Pathology Department of the Waite Agricultural Research Institute on "The role of the State Department of Agriculture".

7. VISITORS:

The following are the people who visited the Section:-

- Mr. D. Stelfox, Plant Pathologist, Canada Department of Agriculture.
- Mr. R. Doepel, Mr. P.M. Wood, Mr. A. Bokor, Plant Pathologists, Western Australian Department of Agriculture.
- Dr. D. Chatel, Dr. C.M. Francis, Research Officers, Plant Research Division, Western Australian Department of Agriculture.
- Dr. R. Boyd, Dr. S.M. Ali, Plant Breeders, University of Western Australia.
- Mr. R.D. Price, Plant Pathologist, Victorian Department of Agriculture.
- Mr. K. Helms, Plant Pathologist, C.S.I.R.O., Canberra.
- Dr. R.J. Banyer, Senior Lecturer, Wagga Agricultural College.

SEED PHYSIOLOGY SECTION

SECTION LEADER:

Dr. K.G. Boyce, M.Ag.Sc., Ph.D.

TECHNICAL OFFICER:

Position vacant

LABORATORY ASSISTANT:

Miss A.M. Kelly

SEED PHYSIOLOGY SECTION

1. SECTION ACTIVITIES:

The function of this new Section in the Agronomy Branch, the Seed Physiology Section, is primarily to generate technical information relating to the production, processing, storage and utilisation of seed by the herbage and cereal seed industry of South Australia. To date, most attention has been given to herbage seed.

A further function of the Section's activities is to service other sections of the Agronomy Branch and other branches within the Agriculture Department (and any other body where necessary), with technical information relating to seeds.

Towards these ends research projects are in progress to develop improved practices for multiplication of seed of perennial grass species of Australian origin. Particular areas of concern are the inter-actions between nitrogen fertiliser and defoliation on final seed yield, the timing of crop harvest, the removal of crop residue and the early regeneration of the grass stand for grazing after harvest.

Overseas interest in the use of South Australia as a seed multiplication area has been assisted by the initiation of studies to determine the seed production potential of herbage cultivars of European origin. The need for an economical and effective means of establishment of weed-free seed crops in the initial year of sowing, a particular requirement for full development of this foreign-bred cultivar programme, has been sought for some years. Earlier successful developmental and extension work has led to the widespread commercial use of the activated carbon banding technique for sowing seed this year for the first time.

Physiological problems associated with cereal seed production have received some attention this year. Initial studies were made to characterise the physiology of post-harvest dormancy in wheat.

2. RESEARCH PROJECTS:

2.1 Grazing management - nitrogen fertiliser for perennial grass seed production - K.G. Boyce

Studies were continued in the Lower South East of the State on Demeter tall fescue, Currie cocksfoot, Medea perennial ryegrass and Sirocco phalaris to determine the influence

on seed yield of time of last defoliation of the stand for seed and the time and rate of application of fertiliser nitrogen.

Generally, under normal South Australian climatic conditions, defoliation of established perennial grass seed crops until early spring has been found necessary for optimal seed production. There is a clear inter-action between nitrogen fertilisation and defoliation. Optimal seed yields are only obtained with split autumn-spring dressings. Rate of nitrogen application and the best proportion of application have been difficult to assess and so form the basis for future studies.

2.2 Time of harvest studies for perennial grass seed crops - K.G. Boyce

Continuing field studies of the optimal time to harvest seed crops of Demeter tall fescue and Sirocco phalaris have indicated significant differences in seed maturation patterns between the two species. Maximum viable seed yield of Demeter tall fescue occurs at about 50% seed moisture content on a wet weight basis. Loss of seed moisture content occurs steadily at the rate of 1 to 2% per day for 7-10 days before this critical moisture content; loss after this is increasingly less predictable and may be very rapid.

Prediction of the point of maximum viable seed yield in the Sirocco phalaris seed crop is much more difficult and is the subject of further study.

2.3 Perennial herbage grass seed growth and development - K.G. Boyce

Studies have been initiated to determine under controlled environment conditions, the influence of climatic and management factors on the growth and development of seed of the most commonly used perennial pasture grasses. Assessment of both physical and chemical characteristics are being made with seed quality as the objective in view.

2.4 Evaluation of seed production potential of foreign-bred species - K.G. Boyce, W. Hawthorne, W.O. Coleman, J. Simons, M. Jongebloed

Initial experimental sowings of European bred cultivars of herbage grasses and legumes indicated excellent potential seed yields under South Australian conditions. Of particular interest are ryegrasses. A continuing programme of evaluation of new cultivars from Europe for seed yield potential has been established. It is expected that seed from other countries will be included in the programme in the future.

2.5 Post-harvest residue removal from perennial grass seed crops - K.G. Boyce

Rapid removal of dry stubble from grass seed crops after harvest is essential if grazing productivity is to be maintained. Investigations were initiated into the feasibility of stubble removal by burning or mechanical removal both as an aid to rapid stand regeneration and to likely subsequent crop yield increases noted in other seed producing areas of the world.

2.6 Physiology of seed dormancy in wheat - K.G. Boyce, T.G. Heard

The post-harvest dormancy period in Australian wheats can be so short that rains during harvest may cause seed damage due to germination in the ear. Studies were initiated to assess the influence of climatic factors on dormancy formation during seed maturation and its loss during subsequent harvest and storage. Varietal differences are also being assessed by the development of a simple screening procedure.

3. MINISTERIAL REPORTS:

Assistance was given to senior member of the Department in preparation of a Ministerial report for implementation of the Government's rural policy on the seed industry. A detailed analysis of present and future research needs for the herbage seed industry was prepared as part of that report.

4. STAFF:

Dr..Boyce resumed duties in the Agronomy Branch in early January after completing a Ph.D. degree in Agronomic Crop Science Department, Oregon State University, Corvallis, Oregon, U.S.A. While returning to Australia he visited the National Grassland Research Institute at Nishinasuno in Japan where he discussed seed production and physiology matters with members of the staff.

Miss Kelly has begun the biology laboratory technician's course at the S.A. Institute of Technology.

5. PUBLICATIONS:

Boyce, K.G. (1973) - "Seed dormancy in tall fescue (Festuca arundinacea Schreb.); acquisition, effect on metabolic processes and relief by temperature and growth regulators". Ph.D. Dissertation, Oregon State University, Corvallis, Oregon.

Boyce, K.G. (1973) - "A scientific approach to grass seed production". Part I. Plant establishment, growth and development. Aust. Seed Review (in press).

SEED PRODUCTION SECTION

SECTION LEADER:

Mr. D.C. Ragless

EXTENSION OFFICERS:

Naracoorte Office

Mr. W.O. Coleman, R.D.A.

Mr. M.C. Jongebloed

Mr. I. Simons

Adelaide Office

Mr. G.E. Cooper

ASSISTANT:

Mrs. D.E. Rattray

SEED PRODUCTION SECTION

1. SECTION ACTIVITIES:

This Section has continued to provide a technical advisory service to herbage seed producers, processors and marketers. Extension schools for people from the seed industry and officers from other specialist sections of the Agronomy Branch have been successfully convened this year. Publications, farmer meetings, field days, symposiums and use of the mass media have all played a part, together with individual contact, in communicating with the seed industry. Marketing advisory services to the seed industry have been expanded. The highlight of these was the successful overseas trip by Mr. Ragless to help develop seed exports.

Following Mr. Ragless' overseas trip, over 100 separate lots of seed samples for trial purposes have been despatched to various overseas institutions, seed firms, plant breeders and farmers. Many of these trial lots have been accompanied with full descriptions of the cultivars and cultural notes. Already several sizeable commercial orders to the South Australian seed trade have accrued from this promotional work.

Seed production advisers in the South East have deputised for district agronomists with general agronomy advisory queries to help give a more continuous service when advisers are absent or unable to cope with all enquiries.

The conduct of the seed certification schemes is becoming increasingly complicated because, as well as a domestic scheme, the Section now implements and administers two international certification schemes. All these schemes supervise production, processing and identification of seed, to high standards of genetic and physical quality. The seed certification plot testing programme which is an essential check on the scheme's operation has continued, but at a less intensive level than formerly due to staff resignation. A number of identifications of unknown seed varieties were carried out on behalf of industry by means of this plot programme.

Trials to assess the effect of herbicides on both weed control and seed yield have also continued to be an important part of the work of the Section. These have been carried out in conjunction with chemical firms and the Weeds Section.

A new much improved seed sampler for chaffy seeds has been developed in collaboration with an engineering workshop and is now in use. Interest from interstate seed authorities suggests it will be adopted as the official sampler in other states.

2. EXTENSION ACTIVITIES:

These have continued to be the major activity of the Section this year. The following table gives a statistical summary of the extent of the service to the seed industry provided by the Seed Production Section.

<u>Extension Activity</u>	<u>Total Visits or Activity for Year</u>
Farm visits	540
Office interviews	679
Letters written	423
Phone calls received	2,610
Phone calls outgoing	691
Press releases written	6
TV programmes presented	3
Radio talks given	9
Press articles written	11
News items written	10
Guest speakers at Bureau meetings	11
Field days organised	1
Training schools convened	3
Guest speakers at conferences	7

The Section has continued to be active in providing the seed industry with technical assistance in growing, processing and marketing quality seeds. Particular emphasis was placed on getting growers to adopt the charcoal banding establishment technique for crops. This programme commenced with the development of attachments in 1971 to a pasture establishment test rig appropriate for use for charcoal banding. This machine has been used both as a demonstration machine to farmers and as a machine to copy when farmers modified their own equipment. Over 141 hectares was sown successfully using this technique. Encouragement of increased production for export has been another major programme. Over twenty-five crops of "new" varieties and species have been sown for multiplication

for overseas countries. The majority of these contracts were arranged by Mr. Ragless during his overseas trip. The Section has contracted with a seedsman in the United Kingdom for production of a field of Splendor perennial ryegrass seed. This, while a fully commercial operation, is being used as an extension medium to demonstrate the feasibility and profitability of the idea to seed growers in the South East.

During the year three training schools have been convened for members of seed industry and other Departmental officers and two seed processors have worked for brief periods in the seed testing laboratory to gain experience in seed identification and analytical methods.

3. RESEARCH PROJECTS:

The Section has been active in carrying out applied research to obtain prompt answers to specific seed industry problems as well as giving some technical assistance to the Seed Physiology Section, particularly with studies on relative seed yield of local and foreign and herbage and lawn cultivars.

Studies were also carried out in collaboration with the Shell Chemical Co., Dupont and CIBA-GEIGY with new herbicides for weed control on seed crops. As a result of this work a new chemical, Etazine 3851, has been registered for weed control in lucerne seed crops.

The following other projects have been commenced:-

3.1 Pasture establishment at Kybybolite - W.O. Coleman

Renovation by five methods of reseeded of improved species into old run-down pastures are being compared on land cropped last year to each of the following:- peas, barley and oats.

3.2 Control of wild geranium (Erodium spp.) in pastures by herbicides - W.O. Coleman

Seven herbicides are being assessed for control of wild geranium and damage to useful pasture species.

3.3 Control of weeds in seedling seed crop of "Terhoy" perennial ryegrass - M.C. Jongebloed

Three herbicides are being assessed for pre- and immediate post-emergent control of a range of weeds, in a young seed crop and to assess the young crop's resistance to the chemicals.

3.4 Control of weeds in seedling Phalaris tuberosa seed crop - M.C. Jongebloed

Three herbicides are being assessed for pre- and immediate post-emergent control of a range of weedy species in a seedling phalaris seed crop and to assess resistance of the young crop to these chemicals.

3.5 Development of an automatic seed sampler for seed certification schemes - D.C. Ragless

This project, to develop a modestly priced, accurate and foolproof system of automatic sampling of seed during processing, is continuing. Indications are that it is feasible to use an unattended device for automatic sampling of more dense seeds but there are unsolved problems with lighter more "chaffy" seeds.

3.6 Control of shepherds purse (Capsella bursa-pastoris) in Shaftal clover (Trifolium resupinatum) -

Tribunil and MCPA were tested for control of shepherds purse and damage to an annual shaftal clover seed crop. Both chemicals gave adequate control of the weed and did not seriously reduce seed yields.

3.7 Control of grassy weeds with I.P.C. in lucerne and strawberry clover -

Application of various rates of wettable powder formulation of I.P.C. to crops of strawberry clover and lucerne was carried out to assess if it was feasible to kill adult annual grass weeds in some established perennial seed crops. Control of grasses with 45 kg of product per hectare was excellent and this rate did not adversely affect crop plants, but severely reduced vigour of adult capeweed and salvation jane plants.

4. MINISTERIAL REPORTS:

The following reports have been provided for the Minister of Agriculture:-

Weed Seeds in Certified Seed - Meningie District Council, September, 1972.

Registration of Seed Cleaning Plants, June, 1973.

Implementation of Government's Rural Policy for Seed Industry, May, 1973.

5. DIAGNOSTIC SERVICES:

With support from specialists within other sections of Agronomy, Horticulture and Soils Branches, seed production advisers have continued to provide the industry with weed, insect, disease and seed identification services. The extent of this service is tabled below:-

Weed identification	161
Insect identification	183
Disease identification	27
Seed identification	29

6. REGULATORY WORK:

The conduct of the Seed Certification Scheme requires that high quality standards be maintained throughout the life of the seed crop from sowing until harvest. Regular crop inspections are necessary to check genetic purity and freedom from weeds. Harvesting and processing of seed is subject to inspection.

Officers of the Section also provide field services on behalf of the seed testing laboratory and the Chief Quarantine Officer (Plants) for South Australia, in the South East.

Details of the regulatory activities for 1972-73 are outlined in the following table:-

<u>Activity</u>	<u>No. Farms Visited</u>	<u>No. Warehouse Visits</u>
Seed certification inspections	871	261
Inspections for seed testing laboratory	-	81
Quarantine inspections	20	14

7. STAFF:

In August, Mr. Ragless visited the Division of Plant Industry, C.S.I.R.O., Canberra, for discussions on seed production and release of new cultivars.

Mr. T.R. Usher resigned in August, 1972.

In September, Mr. Ragless attended the Australian Trade Display in Tehran, Iran, as a seed specialist in conjunction with a display of Australian pasture seeds. Following this he spent two months in Europe and North Africa, visiting govern-

ment institutions, seedsmen, trade officials and development programmes to help foster usage of Australian farming techniques and South Australian seeds.

Mr. M.C. Jongebloed attended a 5 day school on communications in May, 1973 and also completed a Certificate of Agriculture by correspondence.

7.1 Conferences

In July, Mr. Ragless attended as a delegate, the Australian Seed Industry Association National Convention at Surfers Paradise.

In August, Mr. Ragless was South Australian delegate to the Co-ordinating Committee for Seed Certification meeting in Canberra and also the Australian Seed Industry Advisory Committee meeting. In October he attended as an Australian delegate the Annual Meeting of the O.E.C.D. Seed Schemes in Paris and visited the Co-ordinating Centre for the O.E.C.D. Schemes at the National Institute of Agricultural Botany at Cambridge, United Kingdom and the French Seed Certification Scheme's headquarters at Versailles. As part of the same trip he visited the E.E.C. headquarters at Brussels for discussion on South Australian participation in this international seed certification scheme.

Upon returning from overseas, Mr. Ragless spoke at the Annual Meeting of the South Australian Seedgrowers' Co-operative and the Seed Industry Association on developing exports of pasture seeds.

Members of the Section have attended a wide range of other meetings (farmer and industry) and conferences as guest speakers. These are summarised in Section 2, Extension Activities.

A display of pasture seeds was organised in conjunction with the South Australian Seedgrowers' Co-operative at the invitation of the Royal Agricultural and Horticultural Society at the Royal Show.

7.2 Visitors

During the year the Section worked with 15 visitors, six of whom came from overseas to study seed production operations in South Australia. A group of five officers from the Victorian Department of Agriculture undertook a valuable exchange programme with the Section.

Visitors included Mr. J.F. Cucurella (Spain); Mr. R. Coy (United Kingdom), Director, Charles Sharp & Co.; Mr. D. Bryant, International Seed Producers (United Kingdom); Mr. M. Smith, Smyth & Murphy (Victoria); Mr. R. Davidson, Farm Produce Exporters (Western Australia); Mr. G. Meadly, Department of Agriculture (Western Australia); Mr. R.P. Phillips, Wright Stephenson (Victoria); Mr. A. Haile (Ethiopia) and Mr. S. Tournekt (Tunisia).

8. PUBLICATIONS:

8.1 Branch reports

Season Report on Seed Industry. Branch Report No. 41 - D.C. Ragless

Seed Inspection Handbook. Branch Report No. 45 - D.C. Ragless.

The potential for Export of Seeds to the Mediterranean Basin. Branch Report No. 46 - D.C. Ragless.

8.2 Leaflets & other reports

Lucerne Pod Border (Etiella). September, 1972 - W.O. Coleman.

Kabatiella. August, 1972 - W.O. Coleman.

Wingless Grasshopper Control in Seed Crops. December, 1972 - M.C. Jongebloed.

The Development of Seed Exports from South Australia. January, 1973 - D.C. Ragless.

The Role of Seed Certification in Maintaining Seed Quality. May, 1973 - D.C. Ragless.

Seed Acts - Their Strengths and Weaknesses. May, 1973 - D.C. Ragless.

Annual Seed Certification Statistical Report. September, 1972 - D.E. Rattray.

Seed Production Individual Grower Performance Report. October, 1972 - D.E. Rattray.

Monthly Production Reports. D.E. Rattray.

WEED SCIENCE SECTION

SECTION LEADER:

Mr. G.B. Baldwin, B.Sc., R.D.A.

RESEARCH OFFICERS:

Mr. M.J. Catt, B.Sc.

Mr. L.T. Jacobs, R.D.A., Dip.For.

Mr. P.M. Kloot, B.Ag.Sc.(Hons.)

RESEARCH ASSISTANTS:

Mr. D.C. Carter

Mr. L.B. Hoff

EXTENSION OFFICERS:

Mr. R.S. Britton, H.D.A.

Mr. J.A. Dickinson, H.D.A.(U.K.), M.R.A.C.

Mr. S.J. Garrick

Mr. J.N. Hannay, R.D.A.T.

Mr. D.I. Murrie, R.D.A.

Mr. K.R. Smith, W.D.A.

REGULATORY OFFICERS:

Mr. C.R. Alcock, R.D.A., H.D.D.

Mr. A.W. Lewis

WEED SCIENCE SECTION

1. SECTION ACTIVITIES:

During the year five officers in the Section were under intensive training to provide much needed extension and regulatory advice in country districts. Three of these officers have now taken up duties in country areas and the Section is in a better position to fulfil its commitments than it has been for the past five years.

During July, 1972 the Minister of Agriculture appointed a special Weeds Advisory Committee to review noxious weed administration in South Australia. The Section was required to provide the technical secretariat for the Committee and officers assisted at all of the 21 meetings held. A draft Bill has been prepared and is now before the Minister. If this comes into effect weed control boards will be formed throughout the State which should make the Section's advisory and regulatory work more effective. The proposed new regulations will embrace "community" weeds, such as those which are a problem in national parks as well as the traditional agricultural weeds. This reflects the changing role of the Section.

A special extension programme to make users aware of problems associated with the use of hormone herbicides near susceptible crops was expanded to all areas of the State during the year.

The extension programme also concentrated on up-dating a wide range of weed control literature which has a very strong demand from the farming community, home gardeners and industry. In all 37 new extension publications were issued during the year.

The first computerised survey of the distribution and importance of a noxious weed was completed during the year. The survey dealt with silver-leaf nightshade and gave valuable support to a national study of this weed which is causing grave concern. These techniques will now be extended to other weeds.

The research programme conducted by the group is still limited because only two officers are involved. Applied research by the group has centred on weeds of agricultural importance. Priorities have been given to soursob, silver-leaf nightshade, skeleton weed, small flowered pheasant's eye, Calomba daisy and weed control in pasture seed crops.

The success of the research work on the chemical control of soursoy in cereals and the benefits that will result in the pasture phase and in stock health, will return many thousands of dollars to primary producers in the State.

The success of the biological control programme on skeleton weed will also have a marked effect on the productivity of the Murray Mallee region of South Australia.

Improved recommendations for the chemical control of African daisy have come from this year's research work.

Construction has begun on the weeds glasshouse complex, jointly financed by the Australian Meat Research Committee and the State Government. Completion of these buildings will be a great step forward for weeds research in South Australia.

2. REGULATORY ACTIVITIES:

The regulatory activities of the Section can be divided into four main activities, viz:- technical services provided to local government to enable the 140 local councils to effectively administer the Weeds Act, direct inspection of stock and properties, particularly properties outside of local government areas, the treatment of noxious weeds on Crown lands and fourthly, the important task of clearing herbicides before registration. The field regulatory work expanded greatly during the year.

2.1 Services to local government

This year members of the Section made 183 visits to local government authorities. This improved service was made possible by the re-appointment of regional technical officers.

2.1.1 Subsidies

Eighty councils made claims during 1972-73 for finance for noxious weed control on unoccupied Crown lands and on half roadsides adjoining. Payments totalled \$59,300. This was an increase of 30% (or \$13,700) from four less councils when compared with the previous financial year.

Because of adverse seasonal conditions and the fact that some Rural Unemployment Relief funds were used for this work in some districts, the claims made were not as high as originally estimated.

Seventy councils received payments totalling \$62,900 representing half the salaries of 52 approved weeds officers

who worked a total of 6,750 days on noxious weed control. This amount paid in 1972-73 relates to the salaries of these officers for the financial year 1971-72. This was an increase of 5% (or \$3,100) for the same number of councils and officers when compared with the previous financial year.

2.2 Government inspection services - proclaimed weeds

2.2.1 Stock

A total of 38 market inspections were made during the year to inspect for Noogoora and Californian burr on livestock. These inspections involved approximately 1 million sheep and 20,000 cattle. There were 14,500 sheep from 22 properties found infested with burr.

* Yelta market (Victoria) 10

12,500 sheep from 19 properties were found infested. Agents were advised of the infested sheep, pen cards marked, and auctioneers instructed that these sheep were not for sale to South Australian buyers.

Negotiations with the Vermin and Noxious Weeds Destruction Board of Victoria has resulted in their inspectors now sharing saleyard inspections at this market on a three monthly roster. Joint inspections will be made for large sales (20,000 sheep or more).

* Abattoirs market (South Australia) 28

2,000 sheep from 3 properties were found infested. Current practice is to restrict the sale of burr infested sheep for slaughter only. This practice is not proving satisfactory as it does not seriously penalise offenders. A stricter policy will be adopted in future, such that all pens of sheep found with burr will be withdrawn from sale and cleansed at the owner's cost before being re-offered.

Total 38

* Horse inspections

After negotiating with the Agricultural Protection Board of Western Australia an Owner Declaration form is now being used for a trial period for South Australian horses entering that State. This has released the Section from the responsibility of inspection and enabled the manpower available to be used to increase the inspection service for proclaimed weeds outside of local government areas.

2.2.2 Inspections outside local government boundaries

The Section, through the Minister of Agriculture, has the same responsibility as councils for the control of proclaimed weeds and the administration of the Weeds Act, 1956-69, outside of local government areas.

A total of 31 inspections involving 51 man days and 12 locations were made during the year. This was a large increase in this inspectorial work when compared with previous years.

This work aimed to prevent noxious weeds from moving into local government areas along highways and stock reserves. Particular attention was given to the control of Opuntia species in the Flinders Ranges and mesquite in pastoral areas.

2.2.3 Spraying operations for noxious weed control

The staff operated 4-wheel drive unit, operates in specific problem areas where assistance with the control of proclaimed weeds is desirable. This year the amount of spray work done by this unit has increased. Most of this spray work is carried out in areas outside of local government boundaries.

A total of 11 man weeks (55 man days) and \$2,200 for treatment costs was expended during the 1972-73 year.

Additional details of this spray work are set out below:-

	<u>Chemical Costs</u>
	\$
3 days Roopena Station, spray demonstration	112
20 days Nundroo stock route, noxious weed control	976
10 days Eyre & Lincoln Highways, noxious weed control	298
4 days Paringa roadsides, noxious weed control	164
18 days Cleland National Park, African daisy control	650
<u>55 days</u>	<u>\$2,200</u>

Four trailer spray units for use by country-based regional technical officers are nearing completion. These units, designed and constructed by the staff of the Section, feature high-low volume output, booms, hand lines and side jets. They are engine functioned and have diaphragm pumps. They will be used by these officers for research and demonstration work in their regions.

During November and December, 1972, two officers were occupied full time in supervising the contract spraying of African daisy in the Cleland National Park, and organising hired casual labour for hand pulling certain areas.

240 acres were sprayed by helicopter
at a cost of \$5,513.00

Application costs were \$15 per acre
Herbicide costs averaged 8 per acre

Total Cost \$23 per acre

150 acres were sprayed with misting
machines by W.A. Flick & Company
at a cost of \$30 per acre 4,489.00

Approximately 58 acres were hand pulled
by casual labour 6,025.00

78 labourers were employed during the
period, with an average of 22 working
per day. The turnover rate was 25%.
Costs per acre varied with this method
from \$59.00 to \$192.00 per acre.

Approximately 10 acres were hand pulled
by Lions International 500.00

Total \$16,527.00

2.2.4 Clearance, registration & approval of herbicides

To meet the requirements of the Agricultural Chemicals Act, the Commonwealth Technical Committee on Agricultural Chemicals proposed new herbicide labels with supporting research data, and amendments to currently registered labels, are examined by the Senior Weeds Officer and research staff. Recommendations are reviewed from an agricultural viewpoint for accuracy and efficacy. The Department of Health and the Department of Chemistry also review these labels. The change to metric units will increase the time required to review and check labels in the future.

During the year:-

19 T.C.A.C. submissions were reviewed
47 applications for registration of new
herbicide labels were processed
24 applications for registration of amend-
ed herbicide labels were approved

90

There was a noticeable decrease in the number of applications for registration of new herbicide labels and a corresponding increase in the number of applications for amendments to registered labels when compared with the previous year's records.

3. WEED CONTROL ADVISORY & EXTENSION SERVICES:

A continuous diagnostic and advisory service on all aspects of weed control is maintained by the Section, mainly from Head Office. During the year under review approximately 2,100 personal enquiries were handled and 580 letters were sent supporting requests for weeds to be identified and given advice on control.

Some 114 farm visits were made by regional technical officers. This form of advisory work will increase dramatically when all country positions are filled.

During the year the Section has produced 37 extension publications in a concerted effort to bring its advisory material up to date. The sixth edition of "Herbicides for Weed Control" (first issued 1968) was finalised during the year. This will be the first edition showing metric units and it should be available in October, 1973.

Five field days were organised during the year and weed control officers addressed 32 Agricultural Bureau meetings. The main themes for these activities were diuron for soursob control, the biological control of noxious weeds, calibrating weed spray units and the problems associated with the misuse of hormone sprays.

Eleven special press releases were prepared for general distribution.

3.1 Special weed control extension programmes

3.1.1 Hormone herbicides near susceptible crops

A programme to make people aware of the problems associated with these herbicides was expanded to all areas of the State where sensitive crops are grown, in May, 1973.

Section staff were involved in planning this State programme and contacting landholders involved. All landholders within an eight mile radius of the Southern Vales vine growing area were distributed with relevant information. Officers from the Section spent 30 man days in compiling a list and mailing literature for this area.

3.1.2 Weed control training courses

Officers of the Section, in conjunction with the Department of Further Education and Technical Correspondence School, are responsible for a correspondence and lecture course in Weed Control. This course enables students to become qualified as local government weeds officers as required under the Weeds Act, 1956-1969.

3.1.3 Mapping & surveying

A computer survey of the distribution and acreage of the Schedule II noxious weed, silver-leaf nightshade, has been completed. Recording cards were distributed to all district councils in South Australia and the information obtained from this and other sources was coded by Section staff for transcribing onto computer data sheets. Preliminary runs by the computer are encouraging and much valuable information will be available for future use. When the final results of this survey are available the information will be supplied to councils, weeds officers and agricultural advisers for their use. It is anticipated that further surveys will be initiated when the system of recording is finalised. The advent of this type of survey has resulted in interested enquiries from interstate where similar surveys have begun.

3.1.4 Displays

The series of weed displays organised in conjunction with the South Australian Museum staff continued throughout the year. The weeds displayed during the year were:-

African daisy
Indian hemp
Perennial peppergrass

Assistance was given at a noxious weed display organised by the Adelaide Hills Noxious Weeds Committee at Mt. Barker in November, 1972.

4. WEEDS SCIENCE RESEARCH:

4.1 Continuing research

Research continued on six of the eight projects reported in the 1971-72 Annual Report.

4.1.1 Soursob (*Oxalis pes-caprae*) - M.J. Catt

Although the experimental herbicide, oxadiazon (17,623 RP), was reported last year to be very promising for soursob control, the manufacturer did not proceed with commercial production.

At least 60,000 acres of cereal crops were treated with diuron for weed control in the 1972 cereal season. Diuron is gaining rapid acceptance by farmers throughout the State for the control of soursob and other cereal weeds. The benefits gained from soursob control and the control of other weeds in cereals is the direct result of work done by the weeds science research group. Herbicide screening trials for soursob control in cereals and pastures are still continuing.

4.1.2 Silver-leaf nightshade (*Solanum elaeagnifolium*) - M.J. Catt

Herbicide screening trials are continuing. This year the new herbicide, Mon 2139, glyphosate, is being evaluated on this deep rooted perennial weed.

Tordon 50-D is being evaluated as a late autumn spray when compared with the more usual mid-summer treatment.

4.1.3 Biological control of skeleton weed (*Chondrilla juncea*) - M.J. Catt

Releases of three biological control agents for skeleton weed have continued. The rust, *Puccinia chondrillina*, is now spread throughout the Murray Mallee and the previous releases by the weeds science research group aided by council weeds officers, have contributed greatly to the early success of this programme in South Australia. The growth of skeleton weed is being severely restricted, and as mentioned previously, an extension programme to take advantage of the situation is being planned.

The predators, the gall midge, *Cystiphora schmidtii*, and gall mite, *Aceria chondrillae*, have established themselves at the release sites, but as yet have only limited distribution. The mite is inhibiting seed set of skeleton weed.

4.1.4 Scented woolly salvia (*Salvia lanigera*) - M.J. Catt, P.M. Kloot

This work has been finalised and published in the Journal of Agriculture since the last Annual Report.

4.1.5 Small fruited pheasant's eye (Adonis
spp.) - P.M. Kloot

Taxonomic and ecological studies of this annual weed have been completed and are being submitted to the University of Adelaide in a thesis for the degree of Master of Science by Mr. Kloot.

Low rates of bromoxynil (0.71/ha) have been recommended by Mr. Kloot for herbicide control in medic pastures. Recent results indicate that this recommendation needs modification. Work is continuing.

4.1.6 African daisy (Senecio pterophorus) -
P.M. Kloot

Herbicide experiments during the year have indicated that overall spraying with bromoxynil is apparently effective on even very well established bushes of this short-lived perennial plant. Mon 2139 (glyphosate) is also effective. Further work is in progress.

4.1.7 Yellow burr weed (Amsinkia spp.) -
P.M. Kloot

An experiment to assess the effectiveness of various herbicides to control this weed in established lucerne has commenced. It is planned to expand this work into other situations in which yellow burr weed is a problem.

4.1.8 Pasture seed crops - P.M. Kloot

No further work on weed control in pasture seed crops has commenced since the 1971-72 report.

4.2 New research

Research has begun on five new projects. Brief details of these projects are listed below.

4.2.1 Tufted honey flower (Melianthus cosmosus) -
P.M. Kloot

A trial began during the year to examine a range of herbicides for spraying this potentially troublesome weed which is spread over hundreds of hectares in the Cape Jervis area. Initial trial results indicate that this South African plant is susceptible to amitrole, 2,4,5-T and possibly ester 2,4-D.

4.2.2 Calomba daisy (formerly Matricaria,
now Pentzia suffruticosa) - P.M. Kloot

This weed has become a problem over large areas of the Lower North of the State. A long term experiment to assess the effects of soil fertility on the problem has been started.

Herbicide trials have begun and early results indicate that the weed may be selectively controlled in medic pastures using low rates of sodium MCPA at a very early stage of weed growth.

4.2.3 Apple of Sodom (Solanum sodomaeum) -
M.J. Catt

A trial commenced in November, 1972 at Cape Willoughby and it has several promising treatments. Early assessments of herbicides on perennial plants such as this must be treated with caution. Further assessments later in the year may be more conclusive.

4.2.4 Biological control of Californian
burr (Xanthium Californicum) - M.J. Catt

An experimental release of the beetle, Nupserha antennata, was made at Paringa in February, 1973. Establishment assessments have yet to be taken.

4.2.5 Minimum cultivation experiment - M.J. Catt

A trial has begun to compare the experimental herbicide, Mon 2139 (glyphosate) with the commercial product "Spray-Seed", for crop establishment with minimum cultivation.

4.3 Bushfire protection research

4.3.1 Control of Phalaris on roadsides-
L.T. Jacobs

Well established stands of Phalaris on roadsides and in other ungrazed areas provide visibility hazards and present a fire risk in summer. The Bushfire Officer has assessed a number of herbicides for control of Phalaris in such situations. Karbutilate, bromacil, glyphosate and 2,2-DPA appear most promising but at the high rates required, costs could be prohibitive. The use of split applications of 2,2-DPA greatly enhances the effectiveness of this herbicide. This work is continuing.

4.3.2 Control of Eucalypt growth -
L.T. Jacobs

Research work concluded during the year has shown that basal misting of ester 2,4,5-T or a picloram/2,4,5-T mixture in distillate is generally effective for controlling Eucalypt regrowth along fence lines and access tracks. In some cases ester 2,4,5-T or a picloram/2,4-D mixture applied as an overall spray is superior. These recommendations were published during the year.

5. PUBLICATIONS:

Officers of the Section produced 37 extension publications to meet an ever increasing need for this type of material.

5.1 Special bulletins

Catt, M.J. (1973) - Cereal Spraying Chart, 1973.

Jacobs, L.T. (1972) - Chemical Control of Eucalypt Regrowth on Fire Access Tracks and Under Fence Lines. S.A. Dept. Agric. Spec. Bull. 9/72.

Murrie, D.I. (1973) - Beware of Hormone Herbicide Near Susceptible Crops or Plants. S.A. Dept. Agric. Spec. Bull. 4/73.

5.2 Articles, Journal of Agriculture

Catt, M.J. (1972) - Scented Woolly Salvia. S.A. J. Agric. 75: 126-7.

Catt, M.J. (1973) - Biological Control of Skeleton Weed. S.A. J. Agric. 76: 22-5.

Smith, K.R. (1973) - Galvanised Burr. S.A. J. Agric. 76: 30-32.

5.3 Colour plates for Journal of Agriculture

Yellow burr weed. S.A. J. Agric., August, 1972.

African daisy. S.A. J. Agric., August, 1972.

Silver-leaf nightshade. S.A. J. Agric., November, 1972.

Blackberry. S.A. J. Agric., November, 1972.

Lincoln weed. S.A. J. Agric., February, 1973.

Innocent weed. S.A. J. Agric., February, 1973.

Onion weed. S.A. J. Agric., May, 1973.

Winged sea lavender. S.A. J. Agric., May, 1973.

5.4 Weed Control Notes

(1) Bladder campion; (2) Khaki weed; (3) Couch grass; (4) The control of salvation jane on roadsides, fence lines and similar situations; (5) Recommendations for weed control near tomatoes and other susceptible vegetable crops; (6) A guide to cereal crop spraying with MCPA; (7) A guide to cereal crop spraying with amine 2,4-D; (8) A guide to cereal crop spraying with ester 2,4-D; (9) Igram(R) 50% W/W; (10) Avadex(R) 40% W/V; (11) Recommendations for weed control near vineyards; (12) Diurex 80(R); (13) Innocent weed; (14) Artichoke thistle; (15) Sheep's sorrel; (16) Docks; (17) Silver-leaf nightshade; (18) Kikuyu grass; (19) African boxthorn.

5.5 Research publications

Catt, M.J. & Baldwin, G.B. (1972) - The use of diuron for the control of annual weeds in cereal crops. S.A. Dept. Agric. Agronom Br. Rep. No. 39.

Catt, M.J. (1972) - New herbicide for controlling soursob. J. Aust. Inst. Agric. Sci. 38: 139-40.

Kloot, P.M. (1973) - A brief history of weed research in South Australia from 1920 until the present. Aust. Weed Res. Newsl. 17: 10-15.

6. STAFF:

6.1 Staff appointments, movements

Three appointments were made during the year. This filled the three vacancies present at the end of the last financial year and brought the Section to full strength.

Mr. R.S. Britton was appointed as Regional Technical Officer, Area 4, on 7th August, 1972.

Mr. D.I. Murrie was appointed as Regional Technical Officer, Area 3, on 2nd October, 1972.

Mr. J.N. Hannay was appointed as Regional Technical Officer, Area 2, on 26th February, 1973.

For the first time in a number of years it was possible to transfer staff to regional centres. These transfers were made after each officer had spent time training with Head Office and research staff.

Mr. J.A. Dickinson was transferred to Pt. Lincoln office on 7th May, 1973.

Mr. R.S. Britton was transferred to Murray Bridge office on 14th May, 1973.

6.2 Staff training

- Two officers, Messrs. J.N. Hannay and S.J. Garrick, are attending the Taxonomic Botany Course conducted by the Botanic Garden.
- One officer, Mr. D.C. Carter, is attending a Plant Propagation Course conducted by the Botanic Garden.
- One officer, Mr. D.I. Murrie, is attending the Weed Control Training Course conducted by the Department of Further Education and the Department of Agriculture.
- One officer, Mr. M.J. Catt, is attending a Business Administration Course conducted by the Institute of Technology.
- One officer, Mr. J.N. Hannay, is attending a Public Service Board Orientation Course.
- Four officers, Messrs. Smith, Lewis, Dickinson and Britton, attended an In-service training course during the year run by the Department of Agriculture.

During the year all technical officers (weed control) were gazetted as inspectors under the Agricultural Seeds Act. Time was spent training in sampling techniques as required under this Act.

6.3 Visitors

- * Dr. A. Wapshire, officer-in-charge of the C.S.I.R.O. Biological Control Unit, Montpellier (France), visited northern areas of the State with Section staff in September, 1972.
- * Mr. D. Gilbey, Adviser, Weeds and Seeds Branch, Department of Agriculture, Western Australia, spent two days in February, 1973 looking at Section projects.
- * The 10th meeting of the Australian Weeds Committee took place at Victor Harbour in May, 1973. Members of this Committee looked at various Section projects.
- * A sub-committee of the Australian Weeds Committee visited South Australia in December, 1972 and investigated the silver-leaf nightshade problem and African daisy problem prior to preparing reports for Standing Committee on Agriculture.

APPENDIX I

SEASONAL REPORT & PRODUCTION TRENDS

Rainfall for April, May and June of 1972 was very much below average, in fact conditions resembled those of the severe drought of 1967.

Rainfall was above average in most of the agricultural areas in July and August. The exceptions were the Murray Mallee, the Murray Plains and parts of eastern Eyre Peninsula where falls were well below average. Hot drying winds and an unusual spell of dry sunny weather in September was followed by a dry October and prospects at this stage were poor. However, light rains and mild weather in the cereal areas in November allowed crops to finish above expectations. Useful rains recorded in the higher rainfall pasture districts in November also improved the feed situation in these areas.

The 1972 growing season was one of the shortest on record with "useful" rainfall from 25% to 50% below average. The worst affected areas were the Murray Mallee, the Murray Plains and the fringe areas of Eyre Peninsula and Northern districts.

The estimated cereal production for the State was as follows:-

	<u>Hectares</u>	<u>Production (tonnes)</u>
Wheat	1.01M (2.50M acres)	810,000 (29.7M bush.)
Barley	.72M (1.77M acres)	508,999 (22.4M bush.)
Oats	.15M (.37M acres)	67,000 (3.7M bush.)

This estimated total production of 1,385,000 tonnes (56M. bushels) for wheat, barley and oats, was the lowest for cereal production since the drought year of 1967 when 1,073,000 tons (42.6M. bushels) were produced.

Other crop yields were also below average. Pea crops were estimated to yield 8,710 tonnes (320,000 bushels) from 11,700 ha (29,000 acres) and cereal rye 1,905 tonnes (70,000 bushels) from 7,700 ha (19,000 acres).

Oil seed rape was estimated to yield 4,200 tonnes from 5,800 ha and small quantities of linseed, sunflower, safflower, lupins and lentils were harvested.

The dry finish to the season depressed the acreage of pasture seed crops which were actually harvested. Despite an acreage of around half that of the previous season, the total tonnage of seed produced was two thirds of the previous season's production. Yields from irrigated grass seed crops were some of the best ever obtained and total production of some individual varieties such as Currie cocksfoot and Seedmaster phalaris were the highest ever recorded.

Early summer weather was ideally suited to harvesting seed crops. However, rains from February on caused harvest difficulties for later crops, such as lucerne.

The 1972-73 season was a difficult one for graziers in all parts of the State, particularly in the Murray Mallee and other marginal areas.

Spring pasture growth in the higher rainfall areas was quite fair being 50 to 70% of normal but pastures died off over most of the State by the end of October. Where hay was cut yields were generally low. Generally, stock numbers were adjusted to feed availability which fortunately improved following the heavy summer rains of February and March when perennial pastures, in particular lucerne, made very good growth.

2. INDUSTRY DEVELOPMENTS:

The wheat quota for the State for the 1973-74 season is 1,995,000 tonnes (73.3 M. bush.). This quota combined with the incentive of \$1.10 + 10c. for the first payment on wheat deliveries, has induced producers to increase wheat acreages.

The estimated area sown to wheat this season is 1.4M. ha (3.5M. acres).

The wheat situation, coupled with the buoyant wool and meat markets, has restricted the areas sown to barley and peas and on the development of alternative crops, oil seed rape, lupins, linseed, safflower and sunflower. This year some 3,200-3,600 ha (8-9,000 acres) of oil seed rape and 1,600-2,000 ha (4-5,000 acres) of lupins have been sown under contract.

3. PROSPECTS FOR 1973-74:

Excellent opening and follow-on rains throughout the State have provided a "copy book" season so far. Frosts in June and July did not damage cereals or pastures. Strong

winds caused some inconvenience in lighter soil districts but crops had recovered by the end of June. Some over-wet areas were sown late. In most districts the germination and establishment of crops has been excellent.

The estimated areas sown to the three main cereals this year are as follows:-

Wheat	1.44M. ha (3.55M. acres)
Barley	.69M. ha (1.70M. acres)
Oats	.28M. ha (.70M. acres)

Favourable conditions for the remainder of the season will ensure one of the State's largest harvests.

The acreage sown to peas is close to average, that sown to oil seed rape has been reduced to 3,200-3,600 ha (8-9,000 acres), but lupins have increased to 1,600-2,000 ha (4-5,000 acres). Small areas of linseed, safflower, sunflower and lentils will also be harvested.

The pasture season really commenced with the heavy summer rains of February and March which stimulated excellent growth from lucerne and other perennial pastures. Follow-on rains in April which constituted the opening to the season ensured excellent growth from pastures.

APPENDIX II

CROP INDUSTRIES STUDY GROUP

There has been a growing awareness within the Agronomy Branch that closer contact and liaison with the various crop industries is necessary in order that both these industries and the rural community can be most effectively serviced by the Branch. To help achieve this liaison a Crop Industries Study Group consisting of M.R. Krause (Chairman-Convenor), G.D. Webber (Secretary), J.D. McAuliffe and T.G. Heard, was set up as a sub-committee of the Agronomy Branch Senior Officers' meeting in November, 1972.

The functions of the Group can be outlined as follows:-

1. To keep abreast of all aspects of the agronomic crop industries in South Australia.
2. To liaise with crop industry representatives, farmers, research and extension officers.
3. To be a source of information for this Branch and the Department on all matters relating to crop agronomy and marketing.
4. To keep the Branch informed on developments in the industries.
5. To co-ordinate research, extension and seed production policies in keeping with industry developments.
6. To review published information on crop production and utilisation.

At its inaugural meeting, the Group listed the following crops as those to which they should give immediate attention:-

Cereals: Wheat, barley, oats, rye

Oil Seed Crops: Rape seed, linseed, sunflowers, safflower

Grain Legumes: Peas, lupins.

For future discussion, lentils, soybeans, canary seed and processed lucerne products were mentioned.

The Group has met on nine occasions, with meetings taking one of three forms:-

1. Domestic meetings at which reports are tabled and discussed, progress is reviewed and future meetings planned.
2. Meetings with industry representatives at which trends and developments in a specific crop industry are discussed.
3. Attendance at seminars, conferences and discussion groups, where the subject is relevant to the Group's activities. The Group may merely be represented at such meetings, but reports are prepared, discussed and filed in the records.

In the second category of meetings, the Group has met twice with the South Australian Manager of the Australian Wheat Board and a grower representative on that Board. In both cases wheat industry developments were freely discussed and a very fruitful exchange of information ensued. At future meetings both grower representatives will be present.

The Group has met with the Chairman of the Australian Barley Board and a working arrangement which emanated from this meeting is that the Secretary is to contact the Chairman after each Board meeting and be briefed on any developments which are relevant to the Group and/or the Branch. Where such developments are of a major nature, the Chairman has agreed to meet the whole Group.

Meetings have been held with oil seed industry representatives, grain legume (primarily peas) industry personnel, while oats and oat marketing were discussed with Sir Allan Callaghan. Likewise, contact has been made with grower organisations who are actively promoting specific crop industries in selected areas, e.g. the Soft Wheat Growers' Association and the Bordertown Field Pea Marketing Committee, both active in the Tatiara area.

In the third category of meetings, some most interesting and informative seminars and conferences have been attended. Examples of this include a discussion group at which Dr. John Gladstones of the Western Australian Department of Agriculture spoke about Western Australian experiences with lupins and their possible future in South Australia, and a seminar on oil seeds conducted by Messrs. Frank Cutting and Noel Baker of the New South Wales Department of Agriculture (both recently returned from overseas).

The most pleasing feature of the Group's activities has been the ready response received from industry personnel. Without exception, all those approached have expressed interest and willingness to participate when the objectives of the Group were outlined to them. Contact with the wheat and barley industries has already been established on a regular formal basis and it is expected that this arrangement will be extended to other industries.

In the short time of the Group's existence, it is felt that the Branch is already better informed and better able to evaluate and appreciate industry developments and problems so that avenues of work can be planned to serve these industries more effectively. Information obtained is already being used in activities such as framing the current extension programme on grain quality and planning future research programmes in cereals and other crops of potential importance in South Australia.