PLANT BREEDING SECTION

SECTION LEADER:
M.J. Mathison, B.Ag.Sc.

RESEARCH OFFICERS:
I.D. Kaechele, B.Ag.Sc.
*G.W. Lawson, B.Ag.Sc.

TECHNICAL OFFICERS:
C.S. Morner, Landm. (Univ. Sweden)
D.W. Parker, R.D.A.T.

LABORATORY OFFICERS:
(Miss) Barbara M. Martin
(Wrs.) Susan B. McLeay

FIELD ASSISTANTS:
R.D. Hensy
L. Nitschke, B.Ag.Sc.
*K. Sutherland

PLANT BREEDING SECTION

Further progress has been made this year in selecting annual medic and lucerne resis-
tants to damage by sirona weevil adults, and in field experiments associated with the
lucerne breeding programme. The appointment of two field assistants to positions
newly created during 1975-76, greatly helped this work.

From the thousands of annual medic examined for resistance to damage by sirona
weevil adults, about 30 different types have shown some degree of resistance. Work is
proceeding to more clearly characterise the resistance of each type, to transfer and
improve the degree of resistance in agriculturally important species, and to evaluate
the resistant medic for their suitability to South Australian farming. In lucerne, quite
low levels of resistance were found in a few of the thousands of plants examined.
Repeated crossbreeding and selecting has produced improved levels of resistance, and
more populations with a greater percentage of resistant plants. Attempts are being made
to further improve these characteristics to give a really worthwhile degree of resistance.

LUCERNE SELECTION. As with the sirona resistance programme much initial select-
ing of lucerne plants is done under artificial conditions, such as in glasshouses, where
particularly important conditions can be controlled. Lucerne plants resistant to stem
nematodes and with waterlogging tolerance have been found in this way but subse-
extently will need to be checked in natural field conditions. In fact, the first field
experiment to check out waterlogging tolerance has been completed. Indications are
that some of the plants tolerant to waterlogging in pots in glasshouse tests are tolerant
in the field, and that some of the progeny from inter-crossing different types have
better field tolerance than the parents.

Lucerne plants resistant to continuous grazing and lucerne plants with high yields have
been bred and selected in field experiments at Northfield. The next stage in each case
will be to inter-breed the selected plants to produce a population for testing as the basis
of a new improved cultivar.

GRASS BREEDING. The research officer position previously allocated for perennial
grain breeding, has been transferred to the Crop Agronomy Section for grain injury
investigations. The perennial grass breeding programme with tall fescue is now being
maintained on a modest scale by the pooled staff resources of the Plant Breeding Sec-
tion. In present a collection of European, American and Mediterranean tall fescues is
being compared in field plots with summer irrigation in the Adelaide hills. Comparisons
are being made for seasonal productivity with Dement fescue and other perennial
gramin grass cultivars important to South Australia. Attempts will be made to re-comebine
the seasonal productivity peaks of several tall fescues into a single cultivar with high pro-
ductivity in all seasons.

MEDIC SELECTION. As a result of continuing studies of hundreds of introduced
annual medic plants at five key sites in the South Australian wheat belt, many plants
have been selected as potentially valuable for agriculture or for breeding to improve on
existing cultivars. One group of plants of the species Medicago tectorum seems very much
more suited to sandy soils than the present annual medic cultivars. In 1975, further
field trials were started with about 10 of these M. tectorum introductions with a
view to selecting one or more new improved cultivars for sandy soils. The late start to
the growing season in 1975 and 1976 on some of the sandy soils used, is making esti-
mating conditions less favourable than desired for rapid progress. However, it will probably
help ensure that the introductions finally chosen are those best suited to the variable
types of seasons occurring in sandy soil areas.

FUNDING. The annual medic breeding programme is largely funded by the South
Australian Wheat Research Committee and the Australian Wheat Research Council.
Council also supports the sirona weevil resistance programme. The lucerne breeding
programmes are funded mainly by the Australian Wool Corporation. During 1975-76
these breeding programmes were reviewed by the respective industry research funding
organisations and have been given continued financial support.

In both the lucerne and annual medic breeding programmes many seed samples were
collected overseas in 1974 by Messrs. Mathison and Kaehne. Many of these have been
grown in quarantine glasshouses at Northfield and under quarantine at the Parkfield
Plant Introduction Centre during 1975-76 to build up sufficient seed for various
evaluation tests. It was possible to test numerous annual medic for resistance to feeding by sitona weevil adults by using a few leaves picked from the plants. Already three medic collected from North Africa have been identified as showing some resistance to feeding and potential value to agriculture. One of these may eventually more than repay the cost of the seed collecting expeditions.

Conferences and Training Schools

- Intervine Communications Course - C.S. Morner and K. Sutherland.
- Bacterial Wilt of Lucerne Conference by Victorian Department of Agriculture, Melbourne - I.O. Kaehne.
- Monarto Staff Relocation Committee - I.O. Kaehne.

Major Research Projects

- Breeding new cultivars of annual medic for the Australian wheat belt.
- Sward testing of annual medic hybrids and introductions to select breeding lines and potential cultivars.
- Seed coat permeability studies in annual Medicago.
- Selecting and breeding annual Medicago resistant to adult sitona weevils.
- Lucerne introduction and quarantine programme.
- Lucerne selection for high yield and persistence under irrigated and dryland conditions.
- Lucerne selection for adaptation to waterlogged and poorly drained conditions.
- Selection of lucerne for persistence under continuous grazing.
- Lucerne selection for resistance to stem nematode.
- Lucerne selection for resistance to adult sitona weevil damage.
- Evaluating seasonal productivity to tall fescue introductions for selection and breeding.
- Maintenance of herbage plant seed collection (in collaboration with Plant Introduction and Pasture Seed Physiology Sections).
PLANT INTRODUCTION SECTION

SECTION LEADER:
E.J. Crawford, R.D.A.

LABORATORY ASSISTANT:
(Mrs.) M.S. Schubert (part-time)

PARAFIELD PLANT INTRODUCTION CENTRE:
B.G. Nankivell, R.D.A.
P.L. Blesing
L.K. Ramsay
S.H. Kelly
K.S. Roberts
W.R. Porter
PLANT INTRODUCTION SECTION

Increased liaison with World Bank authorities and with F.A.O. experts conducting projects in developing countries, particularly North Africa and the Middle East, strengthened the bonds previously established between the Section and leaders of the various international organisations. This solidarity should lead to further plant exploration and genetic conservation, especially of annual legumes so widespread within the Mediterranean regions, and specifically or annual species of Medicago for which this Department is the custodian of the world collection.

ASSESSMENTS AND TRIALS. At the Parreld Plant Introduction Centre, the agronomic assessment of 565 new horticultural plant introductions received from 24 countries, has emphasised the value of Algeria, Morocco and Greece as sources of plants with good seedling vigour (34 per cent of entries), and Morocco in particular, for subsequent winter production (20 per cent of entries). Only 13 linesflowered earlier than the well known cultivar, Cyprus.

A second trial incorporating 48 of the possible 52 annual subspecies of Medicago, highlighted the value of the existing cultivars in the Parreld environment and also demonstrated the potential of other subspecies not currently represented by commercial cultivars. This was most marked in terms of winter herbage and ultimately relative seed production. Moreover, this trial answered questions often asked by international visitors regarding how the non-commercialised species, commonly occurring in their homelands, perform relative to Australia’s commercial cultivars.

SEASONAL EFFECTS. Rainfall during the growing season in 1976 was about average at the Parreld Plant Introduction Centre. However, paucity of April/June rain together with frosts during a very dry June, retarded early winter growth. The dry first half of the season was offset by above average October falls which ensured high seed yields in most species.

In the five second trials conducted in northern parts of the cereal belt of the State, delayed rainfall also affected winter production. But again seed yields were enhanced by good October rains giving yields as high as 1500 kg/ha in later districts. In the shorter growing season districts of Upper Eyre Peninsula, both herbage and seed production were adversely affected by the lack of winter rainfall.

However, in most instances, seed yields were adequate to ensure satisfactory regeneration in 1976 where sufficient rain has fallen. Unfortunately, many districts are experiencing a similar start to the growing season as was the case in 1976.

Rex Krause (right) discussing sunflower with a visitor to the Parreld Plant Introduction Centre.
Major Research Projects

- Classification of new herbage plant introductions.
- Sward evaluation of 'Spor' barrel medic (*Medicago truncatula*) at three regional centres.
- Sward evaluation of four selected lines of *M. rugosa* at two regional centres.
- Sward evaluation of four lines of *Trifolium subterraneum* ssp. *brevicalycinum* at two regional centres.
- Sward evaluation and relative adoption of 930 phenotypes of 14 annual leguminous genera to a hard setting sandy red-brown earth soil.
- Demonstration and agronomic evaluation of 171 genotypes of 48 annual subspecies of the genus *Medicago*.
- Extension of the annual *Medicago* gene pool.
- Quarantine and seed production of 32 lines of sunflower, (*Helianthus annuus*).
PLANT PATHOLOGY SECTION

SECTION LEADER:
A.J. Dube, B.Ag.Sc. (Hons.), Ph.D.

RESEARCH OFFICERS:
S.M. Ali, B.Ag., M.Sc., Ph.D.
A.H. Mayfield, B.Ag.Sc.

LABORATORY OFFICER:
C.J. Wilmshurst

FIELD ASSISTANT:
R. Short, O.N.D., D.B.S.
PLANT PATHOLOGY SECTION

The Plant Pathology Section over the past few years has been engaged in the development of two collaborative research programmes. Although these are only part of the research conducted by the Section, they will be discussed in detail because they have reached interesting stages of development.

The barley leaf scald is a collaborative research programme between the Plant Pathology Section, Waite Agricultural Research Institute and the Western Australian Institute of Agriculture. The programme was designed to:

- Identify races of the scald fungus
- Study mechanisms of resistance
- Identify sources of resistance of incorporation into commercial barley cultivars
- Assess yield losses caused by the pathogen
- Study management of the disease, e.g. by crop rotation.

We have been fortunate to appoint to the Section, Dr. S.M. Ali who was the Western Australian collaborator on this project. This will mean that the final part of the programme will be completed in South Australia. The 14 different combinations of resistance incorporated into Clipper barley will be field tested during 1977-78.

RUST: The national rust prevention programme has been an important step forward in the control of rust in wheat in South Australia. It is estimated that the assets sustained in 1973 and 1974, estimated at $80M, will not reoccur. The Plant Pathology Section’s part in the programme is to survey the State for stem rust. The survey involves the State-wide collection of rusted cereals and gram hosts. As well as a State survey by the Section, farmers and technologists are encouraged to participate. Those who collect samples are provided with a strain identification as well as a summary of the surveys and its implications. The results of the 1974-75 survey based on 421 samples showed that Halberd was susceptible to 80 per cent of all strains. Gabo and varieties with Gabo resistance were susceptible to all strains. New strains were recorded on Condon, Oxley and Egret, which were not previously known to exist in South Australia. No strains were recorded on Kopp, Eagle, Gatcher, Garnet or Timgalen. Other important attributes of strain identification are the assessment of resistance of the current varieties and also for breeders to incorporate the best form of rust resistance available in their most promising lines.

The field management research project on annual ryegrass toxicity has been completed. The results show that the attempt to stop head formation of ryegrass also controlled the number of disease-inducing organisms in the pasture of the following year. This means that burning, following and hard grazing followed by a cereal crop will reduce these organisms.

Smuticide research has shown that there are several chemicals which show promise for commercial use. Their disease control is better than Ceresan and Hexabuct which have been banned. An advantage of most of these preceding chemicals is that they move within the plant. One chemical, a nonsystemic, is a liquid which will provide farmers with an alternative to the usual dust formulations.

EELWORM: Studies on cereal eelworm continued. The oat variety West was compared with Swan, Avon and Early Kherson. Swan and Avon were the least efficient in multiplying the eelworm and Early Kherson was one of the most efficient. West was close to the efficiency of Early Kherson in allowing multiplication of eelworm on the roots. This finding is of concern as the majority of South Australian farmers grow Swan or Avon which has probably been checking eelworm populations. A switch to West could lead to an aggravation of the cereal eelworm problem.

This growing season, the emphasis on cereal eelworm research is on chemical control. Studies have commenced on the use of a liquid fumigant and a granular chemical which will control eelworm at several sites in the cereal belt. These studies are an extension of a successful Victorian research programme for which economical returns were gained following eelworm control.

Another interesting project started this year is the chemical control of powdery mildew of barley. This study will involve farmers on Lower Yorke Peninsula and in the Lower

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South East, in developing chemical control techniques suitable for their area and problems.

All the projects completed and in progress are of an applied and practical nature and appear to be of considerable value to primary producers.

Current Research Projects

Surveys of wheat stem rust strains in South Australia
Control of powdery mildew of barley with fungicides
The effect of leaf scald on the yield and quality of barley
Development of scald resistant lines of cv. Clipper
Cereal Smut disease assessment
Control of cereal stemworm with nematicides
Annual Ryegrass Toxicity Investigations.
SEED PHYSIOLOGY SECTION

SECTION LEADER:
K.G. Boyes, M.Ag.Sc., Ph.D.

RESEARCH OFFICER:
* C.M.J. Williams, B.Ag.Sc. (Hons.)

TECHNICAL OFFICER (LABORATORY):
(Ms.) A.M. Kelly

* Transferred to Research Centres Branch.
SEED PHYSIOLOGY SECTION

The work of the Section involves generation of technical information relating to production, processing, storage and utilisation of all types of seeds. Investigations are in progress on herbage, cereal, grain legume, vegetable, flower and turf seeds.

PASTURE PRODUCTION. Agronomic research is in progress at Kybyolite Research Centre to determine the influence of stocking rate, grazing management and nitrogen fertiliser on seed yield and wool production using three perennial grass species. To date, the results have highlighted the overwhelming influence of the length of the grazing season on maximum economic return of both seed and wool. Grazing pressure and fertiliser application, although important, have lesser influence. However, an integrated strategy of management appears necessary for maximum economic productivity.

Other field projects include continuation of the evaluation of seed production potential of foreign and local cultivars of herbage grasses and legumes, turf grasses, flowers and vegetables. Studies on harvest technology of perennial grasses are continuing with the development of preferred time and method of harvesting *Phalaris tuberosa*. An improved technique for windrowing barley crops before harvest has been researched and incorporated into production technology information available to seed producers. A new method has been developed for pre-harvest management of vegetable seed crops which are prone to loss due to seed shattering from the mature head. A quick-drying glue sprayed onto the crop just prior to harvest, results in significant increases in seed yield and economic returns.

SEED QUALITY. Two seed quality experiments of significance are in progress. Commercial size lots of all the major herbage grasses and legumes are being monitored for quality deterioration in six commercial seed warehouses around the State. The results of this experiment will give seed merchants a guide to the storage life of those seeds. A successful extension project has been carried out in association with Mr. Hoog of the Seed Production Section. This project was aimed at showing seed growers, processors and merchants the need for monitoring of seed moisture levels to prevent seed quality deterioration. The use of moisture meters was introduced, and this instrument is now in service with practically all processors and merchants.

Seed quality in lupins has been investigated. Many samples of seed for sowing have been shown by germination test to be of poor quality. The relationship between laboratory test and field performance is under investigation. Initial indications are that the standard laboratory test is a reasonable guide for predicting seed germination and subsequent establishment in the field.

GERMINATION RESPONSE. In the laboratory and controlled environment units, experiments are in progress to show the germination response of various seeds to temperature as an aid to selection in the plant introduction programme and a guide for routine seed testing.

In addition the inhibition of germination of the seed of annual *Medicago* species by the presence of *wireweed* is being investigated. This is a major problem in wireweed infested districts of the mixed cereal farming areas. It appears that a substance which prevents root and shoot elongation of medic seed is washed from wireweed by rain thus upsetting normal germination response.

Conferences, Training Schools and Study Leave

Conferences

- South Australian Seed Producers Association Annual Meeting, Struan, South Australia, 28th October, 1976.
Committee Meetings

- Seed Industry Association — Australian Seed Producers Federation Consultative Research and Development Group, Melbourne, Victoria, 27th October, 1975.

Interstate Study Tour

- Victorian seed production areas and Victorian Department of Agriculture Seed Research Group, Burnley, Victoria, 22nd-28th September, 1976 — K.G. Boyce.

Training Schools

- In-service writing school, April, 1976 — C.M.J. Williams.

Training

- Effect of grazing and nitrogen applications on perennial grass seed yield — C.M.J. Williams, K.G. Boyce.
- Time of harvest studies for perennial grass seed crops — K.G. Boyce.
- Evaluation of seed production potential of foreign bred species — K.G. Boyce, C.M.J. Williams.
- Seed quality investigations with lupins — K.G. Boyce, R.M. Kain.
- Harvest studies on vegetable seeds — C.M.J. Williams.
- Phenological development in sown pasture grasses — K.G. Boyce, L. Cook and P. Robinson (latter two from Victorian Department of Agriculture).
- Storage studies with herbage seeds — K.G. Boyce, E.S. Hogg, G.E. Cooper.
- Inhibition of medic seed germination by wireweed — K.G. Boyce, P.M. Kloost.
SEED PRODUCTION SECTION

SECTION LEADER:
D.C. Ragles

SEED PRODUCTION ADVISERS:

Adelaide
G.E. Cooper
C.A. Schulert

Struan
W.O. Coleman
I.H. Simmons
E.S. Hogg

TECHNICAL ASSISTANT:
(Ms.) J. Birrell
SEED PRODUCTION SECTION

Following the 1972 visit by Mr. Ragless to the Mediterranean region, and his report (Agronomy Branch Report No. 46) that the area was an immediate potential market for annual medic and sub-diver seeds, the seed industry began developing markets in North Africa for annual medic seeds.

To supply this market with its requirements, a rapid increase in production, particularly of Jemalong barrel medic, was essential. A programme aimed at increasing production was initiated using mass media, Departmental publications, field days, farmer meetings and individual farmer contacts, to inform growers of:

- Costs and returns possible from medic seed production
- The potential market
- Proven specialised methods of production.

Pasture seed being loaded for Libya.
It has proved to be an outstanding success. Growers responded to the extent that production increased by 200 per cent in two years and the potential market as seen by Mr. Raglan has become a reality. Export sales of pasture seed to Mediterranean regions have increased from a token amount in 1972 to some $2M. worth of medic seed in the latest export year.

OTHER SEEDS. Other seeds have not been neglected in the Section's efforts to promote production and marketing opportunities. For example, work with Paraivvo lucerne has aimed at increasing seed production, reducing the price of seed, improving distribution of seed and, with the help of some of the district agronomists, publicising and demonstrating Paraivvo's value.

The Section, in conjunction with the Steedgrowers Co-operative, C.S.I.R.O. and other officers of the Board has worked to secure inscription in the E.E.C. countries of the Australian cultivar, Demeter. This will enable the development of a potentially large export market to the benefit of growers of Demeter tall fescue seed.

In addition to the Jamalong barrel medic programme, a sales promotion campaign has commenced for seed of annual medics and clovers grown in northern agricultural regions. This is being carried out in association with the seed industry and district agronomists through publicity and demonstrations. Results already reported by seed sale outlets are most encouraging.

Working with Paraivvo Research Centre, promotional publicity, demonstration plantings and field days have been arranged, together with a pricing policy to enable Trikkala sub. clover seed to sell at a level realistic to both growers and users.

TOTAL PRODUCTION. The total production of certified seed in South Australia for the 1975-76 season was about the same as in each of the previous two seasons. By comparison, production in most other States dropped by from 50 to 70 per cent from the previous year’s production. This comparison is mainly a reflection on South Australian marketing methods, but also it indicates the effectiveness of specialised production methods as used in South Australia.

Harvesting sub. clover near Mundulla.

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NEW TECHNIQUES. Several new techniques and innovations have been introduced this year to further improve and refine the production, certification and marketing of pasture seeds.

A major limiting factor in the production of annual medic and clover seeds using conventional machinery, is the slowness of the harvesting operation. In conjunction with the Department of Defence, the Weapons Research Establishment, an investigational and developmental programme has commenced to try and overcome the problem. All conceivable methods of seed gathering will be considered, then the most promising will be selected and developed to a stage where it could be commercialised. Some of the new systems, such as utilising the electrostatic properties of seed, have possibilities for the future.

The past year has seen several "firsts" in certification and testing, notably:-

- Oat seed certification has been introduced.
- For the first time in ten years a substantial quantity of certified lupin seed was produced.
- Field plots designed to check the effective operation of certification procedures in producing high quality seed are now being used for all categories of seed. Plot testing for 1973-74 has been completed and has indicated an excellent operation of all schemes.
- A new method of labelling of certified seed has been devised. This will cut the cost to the Department by over 50 per cent, cut costs to seed cleaners, enable more streamlined procedures, be more legible, more durable and provide more information.
- Comparative testing of the automatic sampler developed in association with Hesthville Pty. Ltd. has continued and indications are that the method is accurate and virtually fool-proof.

When the Waite Agricultural Research Institute relinquished responsibility for maintenance breeding of Currie cocksfoot, the Seed Production Section took over this responsibility. High quality breeder seed was produced this year and is now available to the seed industry throughout Australia for the first time for several years. A very small quantity of authentic seed of Hanford barrel medic and Snail medic has been multiplied at Northfield and for the first time supplies of pre-basic seed are now available to make possible (if needed) certification of these cultivars.

LIAISON. At the invitation of the Australian Development Assistance Agency, Mr. Ragless presented lectures in Brisbane and Melbourne to members of the International Training Course on Seed Improvement and Certification. Subsequently, two members of the Course, one from India and one from the Philippines, worked in the Seed Production Section of the Agronomy Branch for a training period of one month.

A bi-monthly newsletter to report industry activities and provide improve liaison between sections of the seed industry and the Department of Agriculture and Fisheries has been commenced and is proving to be highly successful.

Current Projects
Seed for certified crop establishment
Production of certified seed in the South East of South Australia
Seed cleaning costs
Dock weed control in lucernes
Certified perennial grass seed containing dock
Grass weed control in legume herbage seed crops
Pasture seed production costs
Increased annual medic seed production
Seed storage
Promotion of certified seed,
Conferences and Schools

Mr. Ragless attended the following meetings which were held in Sydney concurrently in February, 1976:

- The Australian Seed Industry Advisory Committee meeting
- The Co-ordinating Committee for Seed Certification meeting
- The Chief Seed Testing and Regulatory Officers meeting

The Seed Production Section has been represented at all meetings of the Seed Industry Association and many meetings of the Seed Producers Association.

Most officers of the Section attended the annual meeting of the Seedgrowers Co-operative and the Mini-Branch Conference on Cereal and Crop Seed Production.

Messrs. Cooper and Simons attended the In-service training school on Communication held in Adelaide in May.

Mr. Hogg attended the Local Government Weeds Officers' Conference in Adelaide in May.
WEED SCIENCE SECTION

SECTION LEADER:
G.B. Baldwic, B.Sc., R.D.A.

SECRETARY, WEEDS ADVISORY COMMITTEE:
J.M. O’Neil, R.D.A.

RESEARCH OFFICERS:
*P.M. Kloot, M.Ag.Sc.

RESEARCH ASSISTANT:
D. Carter

EXTENSION OFFICERS:
*R.S. Britton, H.D.A.
B.J. Garrick
D.T. Murrie, R.D.A. (Hons.)
K.R. Smith, W.D.A.

REGULATORY OFFICERS:
A.W. Lewis

OFFICE ASSISTANT:
(Mrs.) M. Hill (part-time)

*Temporarily attached to other Sections.
WEED SCIENCE SECTION

The year 1975-76 has been a difficult one for the Weed Science Section extension services. The Senior Agronomist (Weed Science), Mr. Baldwin, is studying in the United Kingdom and has been absent for 10 months. Mr. Smith, the South East Regional Weeds Agronomist, has been studying at Roseworthy Agricultural College since February, 1976. Mr. Britton transferred from the Murray Mallee region to the Northern region to fill a position which had been vacant since March, 1975 which now leaves the Murray Mallee region vacant.

Since February, 1976, Mr. Alcock has been seconded for up to 50 per cent of his time to the Monarto Development Commission to carry out a botanical survey and advise on weed control relevant to intended land use at Monarto. It is expected that this service will continue for a further 12 months at least.

During a private visit to Canada, Mr. Alcock was assisted by the Department in a three week investigation into weed control in that country. His interesting observations are contained in Agronomy Branch Report No. 72.

PEST PLANTS BILL. The most significant development during the year was the final passage through Parliament of the Pest Plants Bill on 18th February, 1976 and its proclamation on 15th April, 1976. This culminated three years of intensive preparation and consultation with local government, primary industries and at Parliamentary level. The Pest Plants Commission has still to be appointed before the new legislation can be enacted.
WATER HYACINTH. Following a meeting of the Working Panel on Water Hyacinth at Moree in November, 1976, there are now encouraging signs that this infestation is receiving serious attention not only from the three States concerned, but also from the Commonwealth Government. Major flooding throughout the infested area during the early part of 1975 with the possibility of water hyacinth spread to the westerly river systems, has demonstrated the need for urgent and positive action to be taken. Close surveillance of the Darling and Murray River systems is being maintained since the flooding.

Dr. D.S. Mitchell, a world renowned aquatic weed expert from Rhodesia, assisted the Working Panel in formulating measures to control the Moree water hyacinth infestation. We are also indebted to him for a general assessment of problem water weeds within Australia and their potential threat to our water conservation systems.

The campaign to prevent “off target” herbicide damage to crops within the State has continued. Only isolated damage to tomatoes and vines was reported during this year. On Eyre Peninsula, misuse of soil sterilant type herbicides was noted.

SKELETON WEED. The increasing number of outbreaks of skeleton weed on Yorke and Eyre Peninsulas and in the Mid and Lower North is of particular concern. Previously many councils have done much to contain skeleton weed outbreaks by encouraging landholders to destroy the weed, but it is now apparent that work is declining in some council areas due to an erroneous assumption that containment and eradication can be obtained by biological agents.

Field trials were carried out during the 1975 season to evaluate various herbicides for weed control in field crops, including cereals, lupins, and flaxweed. However, unpredictable weather conditions, particularly during the winter period made meaningful assessments difficult. The unusually dry start to the 1976 season may again complicate assessments.

Biological control of Eremophila species using the weed, Apion antipodum, is continuing to be assessed. Releases were made at eight new sites throughout the State in addition to the original 1974 releases at Pt Pirie and Two Wells. Observations and possibly further releases will continue to be made during the coming year.

Field demonstrations using Asulox® for the control of bracken fern have been very encouraging. Further work will be carried out using various additives, including urea to induce herbicide application rates and hence cost.

Weeds Office's Grant Baldwin and Arthur Lewis treating mesquite at Wallerberdina Station.
REGULATORY. Generally, regulatory services were inadequate to effectively cover the many aspects involved. It has been difficult to maintain previous services with the current level of personnel resources at some 30 per cent below strength.

Most councils have maintained weed control services but unrest and wait-and-see attitudes are becoming apparent due to the delay in implementation of the new Pest Plants Act.

Government funds "Control of Proclaimed Weeds", totalled $230,000 and of this amount $224,000 was distributed to 87 councils as repayment for Crown land works and salary subsidies for 46 weeds officers.

Most weeds officer vacancies with councils are now filled but there are 13 unqualified officers employed and experienced officers continue to seek other work.

Stock inspections, mainly for Noogoora burr, totalled 69, and involved 861,000 sheep and 81,250 cattle. No burr were detected on the cattle but 5,967 sheep (1:50) were infested. Details are as follows:— 7 visits to Yerta, a total of 63,000 sheep inspected and 5,034 (1:12) were burr infested; 61 visits to Gepps Cross, a total of 778,200 sheep inspected and 533 (1:1,500) were burr infested; 1 visit to Peterborough and no burr was found in the 20,000 sheep inspected.

Regulatory patrols outside local government areas reported that of the weed areas inspected, heavy infestations of mesquite, Noogoora and Opuntia were found. Treatments were carried out against these weeds. Roadsides, Kimba/iron Knob, Cowell/Kimba, stock route west of Penong and Paringe to the Victorian border were sprayed for a range of noxious weeds.

Khaki weed was inspected at Arkaroola and reported from Commonwealth Hill station. Mesquite has been reported to be in the far north east region of the State and the spread of boxthorns is causing concern for some pastoralists.

It is intended to investigate these matters and to stimulate more weed control activity in the pastoral areas.

Californian burr is now well entrenched along the Murray River, at least from Mannum to and beyond the Victorian border.

Conferences, Training Schools and Study Leave

- Sixth Local Government Weeds Officers' Conference, Walkerville, 28th-29th April, 1976 — organised by C.R. Alcock and Section officers.

Current Extension Projects

- Biological control of *Eremostema spp.* — Assessment of State-wide field trials using the insect, *Apion antiporum* (10 sites in all).
- Biological control of skeleton weed — continued assessment of predators.
- Control of bracken fern with the herbicide, Asulam — This will also involve the use of additives, e.g. area with the object of increasing the effectiveness and lowering costs of treatment.
- Chemical control of bracken fern in established lucerne.

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- Weed control in lupins.
- Water hyacinth publicity campaign.
- Bromegrass control in cereal crops on Eyre Peninsula.
- Continuing "off target" damage campaign.
- Comparison between I.P.C., Carbetamide and Pronamide in strawberry clover.
- Comparison between I.P.C., Carbetamide and Pronamide in subterranean clover.
- Tolerance of strawberry clover to Asulam.
APPENDIX I

PUBLICATIONS

Aeronomy Branch publications for the year ending 30th June, 1976 are listed under section headings with authors' names in alphabetical order.

AGRONOMY EXTENSION:


Marrett, P.L. — Agriculture in S.A. Series — "The Lower South East".


Webber, G.D., Cocks, P.S. and Jefferies, B.C. — "Farming Systems in S.A.".

Williams, S.S. — "Drainage Comes First in Improving Murray Swamp Pastures". Leaflet No. 2674.

BUSHFIRE PROTECTION SECTION:


Francis, B.J. — "Fire Safety with Farm Machinery". Fact Sheet.

Francis, B.J. — "Spontaneous Combustion of Hay". Fact Sheet.

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APPENDIX II

EXTENSION ACTIVITIES FOR YEAR ENDING 30/6/76

The extension of agricultural information is of prime importance in the work of officers of the Agronomy Section. Following is a list of the main extension methods with the approximate number of each activity.

PERSONAL CONTACTS:

- On-farm visits ................................................. 3,500
- Rural group-meetings and field days .......................... 600
- Office, laboratory and trial site visitors ...................... 7,000
- Telephone enquiries ........................................... 15,000
- Regulatory inspections ........................................ 2,000
- District council visits ....................................... 300

MASS MEDIA:

- News items .................................................... 260
- Information publications .................................... 70
- Radio broadcasts ............................................. 150
- Agricultural condition reports .............................. 170

Expressed in broad terms, this means that an every working day of the year Agronomy Branch officers in various parts of South Australia visited 12 farms, attended two group meetings or field days, talked to 26 visitors, answered 50 telephone enquiries, carried out seven regulatory inspections and dealt on a district council to give advice and information, plus extension work with mass media.