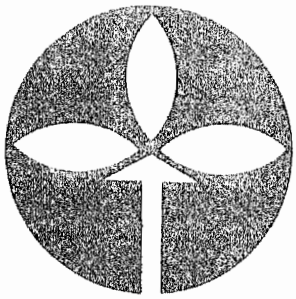

DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

Agronomy Branch Report

INVESTIGATION INTO SEED PRODUCTION, MARKETING AND OTHER MATTERS IN EUROPE AND THE U.S.A.

E.D. Higgs.

Report No. 34

REPORT ON INVESTIGATIONS BY E.D. HIGGS FOLLOWING HIS ATTENDANCE AS AUSTRALIAN DELEGATE TO THE O.E.C.D. CERTIFICATION SCHEMES HELD IN PARIS

MARCH 29TH to APRIL 1ST 1971.

CONTENTS

INTRODUCTION

Following the appointment of Mr. E.D. Higgs as Delegate (financed by the States and Commonwealth jointly) to the Annual Meeting of the O.E.C.D. Seed Certification Schemes, the State Government of South Australia provided a sum of money to enable Mr. E.D. Higgs to prosecute a number of investigations and discussions with people in Great Britain, Holland, West Germany, Denmark and Oregon U.S.A., who were thought could assist in the development of the South Australian herbage seed industry.

A separate report covering the O.E.C.D. meeting and other visits made in connection with O.E.C.D. matters has been prepared.

Due to the short time elapsing between the time the decision was made for Mr. Higgs to attend the Paris meeting, a decision made on 19th February 1971, and due to the postal strike prevailing in Britain in the many weeks following this date and not finishing until well into March, planning of this trip was rendered somewhat difficult.

The major objectives were to maintain and improve relationsjips between the South Australian Seed Certification Schemes and the South Australian Seed Industry in general on the one hand and users of seed of Australian origin in Britain and Germany, on the other hand, to study particular aspects of the seed industry of Britain, Holland, Denmark and U.S.A.; aspects which have become relatively more important.

since the earlier visits made in 1967 to study a wide range of aspects of the seed industries of the countries mentioned together with Canada and New Zealand.

The major change taking place over the recent four or five year period in our seed industry in South Australia has been a very substantial decrease in price paid for seed which has meant that the costs of processing and marketing of seed have become a very much greater percentage of the overall price received by seed growers and are in fact on a per acre basis by far the biggest cost involved in producing seed in high yielding cultures.

PERSONS AND INSTITUTIONS VISITED

Officers of South Australia House, Mr. Dean and Mr. Pedder together with their assistants were most helpful immediately prior to my visit to Paris and on several occasions subsequently. They particularly assisted in last minute arrangements by telephone on my arrival in London prior to the Paris meetings.

Discussions were held in Paris with the Le Rossignol and his assistant of the Australian trade commissioner service regarding our seed industry and the possibilities for markets particularly in Spain which is covered by the Paris trade commissioner's office.

In Britain visits were made to the National Institute of Agricultural Engineering at Silsoe, Bedfordshire to Mr. Gareth Gwynn Regional Grassland Husbandry Adviser for the South of England stationed at N.A.A.S. Coley Park Reading, Mr. Dennis Bryant of International Seed Producers Limited Bury St. Edmonds, Suffolk, and Mr. K.A. Pearce of Messrs. Dalgety Limited, London.

In Holland the visit was under the general supervision of Mr. von Dixhoorn of N.A.K. the Dutch Certification Authority and entailed visits to the Certification control plots at Emmelord in the North East polder and the Dutch Seed Testing Station at Wageningen.

In Germany visits were made to the Australian Trade Commissioner (Mr. G.H. Watkins) at the Australian Embassy in Bonn, Mr. W. Burr the Official in the German Ministry of Agriculture in charge of seed laws in Germany also at Bonn, to Messrs. L.C. Nungessor of Frankfurt-am-Main and Mr. Harald Littman of Timdorf near Malente-Gremsmuhlen. The latter two being merchants dealing with South Australian merchants handling South Australian grown seed.

In Denmark the visits were made to the Seed Certification Committee (Mr. E. Søngdergaard) and the D.L.F. organisation where I had discussions with Mr. Paulson and Mr. Ovesen. A brief visit was made to the D.L.F. and F.D.B. Plant Breeding Station at Store-Heddinge where the facilities were inspected and discussions held with Dr. K.J. Fransden.

A four day visit was made to the Oregon State University at Corvallis Oregon where Dr. J. Richie Cowan Head of the Department of Farm Crops organised the visit. Mr. Kevin Boyce an Officer of the Agronomy Branch of the Department of Agriculture (on leave) is currently a post graduate student at this University working for his Doctorate of Philosophy. Besides those held with Dr. Cowan, discussions were held with Oregon State University staff, Doctors Wheeler Calhoun, Gary Cooper, M. Dawson, W. McGuire, Dr. Hill (emeritus head of Farm Crops), D. Chilcote, R. Warren and R. Frakes. A meeting of the Orchard grass growers league was attended.

A number of U.S.D.A. staff employed on the campus of Oregon State University were also visited. Dr. J.R. Hardison was contacted to discuss in particular the "Black Springs" syndrome of the mid-north of South Australia, Dr. Orvid Lee concerning the establishment of seed crops using the charcoal herbicide technique and Dr. Leonard Klein who is responsible for the development of the belt threshing principle into a commercial seed harvester.

Overall there was only one person or organisation which it was planned to visit prior to departure from Australia who was not contacted, this was Mr. G.F. Donaldson an authority on the economic optimisation of harvesting equipment in relation to the size of the task facing the machine, and time of availability of suitable harvesting weather. He had transferred his employment from Wye College in Britain to the International Bank for Reconstruction and Development in the United States, a fact which did not become apparent until after my return from overseas, as letters to him at Wye College had taken a considerable time to eventually reach him at his new place of employment.

MARKETS FOR SOUTH AUSTRALIAN GROWN SEED IN BRITAIN AND EUROPE.

South Australian merchant firms have for some time been engaged in limited trade with European merchants. Every effort was made to contact firms who have in the past had contact with South Australian merchant firms with a view to improving relationships and in one particular instance the solving of a particular legal difficulty covering the entry of South Australian grown seed into Germany.

The majority of seed being multiplied on behalf of European merchants at the moment is of various varieties of Brassica species, used for growing feed for livestock. The reason for the development of this trade did not become apparent until discussions were made in Britain and then not in the course of discussions with the merchants concerned.

It was indicated to me by Mr. Gareth Gwynn and Mr. Sam Campbell of the National Agricultural Advisory Service at Reading that while there had been rather poor harvests of Brassica's in Western Europe and Britain in recent years, which partly contributed to the interest shown by European and British merchants in having seed multiplied

in Australia, the more important factor influencing demand for Brassica seed was the relative prices of feed grains and the cost of producing feed for cows via Brassicas. This relationship had changed in favour of Brassicas and that while grain prices are at the levels then current there will be a greatly increased interest in Brassicas which have been relatively in a decline for a considerable period of time.

The major use of Brassicas in recent time has been to provide cover for Pheasants rather than primarily to be a source of fodder and in future it is likely that the fodder aspect will become very much more prominent.

Mr. K. Pearce of Messrs. Dalgety Limited, London who have arranged multiplication of Kale in South Australia, expressed interest in further development of seed multiplication in Australia but felt that it was up to the Australian Seed Trade to establish that they could in fact deliver seed on time reliably and in the quantities specified in the contracts.

If in the case of the crops being grown at the moment for Dalgety's this point of reliability can be established then there would be good opportunities for expanding this trade. However, if in fact poor multiplications were the best that could be achieved then he would not be prepared to further consider multiplying seed in Australia.

As it is necessary for effective forward planning of contracts of seed multiplication to have an accurate indication of the way particular crops are developing it was indicated to Mr. Pearce that our seed certification staff would provide a monthly report on the conditions of all crops being grown for Dalgety's London so that if there is a shift in the potential supply from South Australia that Dalgety's London can make the necessary adjustments in contracts being organised in other parts of the world.

A day was spent with Mr. Harald Littmann, a breeder of Brassicas in Northern Germany. He has organised the multiplication of seed of his variety "Stabil" through the agency of Messrs. International Seed Producers Limited of Bury St. Edmonds, Suffold, England and the South Australian Seed Growers Co-operative in South Australia.

In the case of seed entering Germany, the German Seed Law sets various standards and procedures which required some investigation to fully comprehend. It was therefore arranged that I saw Mr. W. Burr at the Ministry of Agriculture at Bonn in Germany.

It is now believed that suitable procedures for the entry of seed into Germany have been established as a result of the visits I made to these three firms and the German Ministry of Agriculture, and subsequent correspondence using the Australian Trade Commissioner's office in Bonn as an intermediary.

As a result of inspection of Mr. Littman's operation and discussions with him it was indicated by Mr. Littman if successful multiplications occur from the current crops of "Stabil" marrow stem Kale being grown in South Australia then he would consider maintaining a stock of basic seed in Adelaide so that crops could be organised at comparatively short notice particularly following a period of severe winter killing in Europe which is one of the major hazards he has to contend with even though his operation is close to the Baltic Sea and enjoys a much milder winter than much of Germany.

A sample of 'Polyp' vetch another of Mr. Littman's varieties was obtained and has been planted in trial plots at Naracoorte and Keppoch.

As a result of visits with the various people involved in multiplying seed in South Australia for the European trade it is felt that providing that we can meet delivery committments together with the appropriate quality of seed that there is a considerable opportunity to enter into a comparatively large market. However it is a very competitive market and to sustain a position in it it will be essential that we perform considerably better than has been achieved in the past in regard to yield.

INVESTIGATIONS INTO SEED HARVESTING TECHNIQUES

(a) Swathing of Seed Crops in Denmark and Oregon

Seed harvesting is now a matter which requires considerable improvement in South Australia to bring it up to the standards achieved in countries which are either potential or actual competitors for Australian seed.

While direct harvesting at high moisture content followed by artificial drying is the preferred method of harvesting grass seed in Britain, in Oregon and Denmark the grass seed crop is cut and swathed at high moisture and allowed to mature in the swath.

In Oregon expensive self propelled machines designed specifically for Oregon conditions are used almost exclusively. These are most economic in the Oregon situation but have greatly excessive capacities for use in South Australia where few grass seed growers have even 100 acres of crop. The latest Oregon machines would handle over 1000 acres of crop in the few weeks of the year they are used.

In Denmark inexpensive attachments to the ordinary reciprocating mower are used for swathing crops. These should be considered by the smaller seed producers in South Australia.

Within South Australia swathing is increasingly practiced but has yet not been fully developed technically. Large losses are still incurred by faulty timing and unreliable and rather unsatisfactory equipment following swathing.

(b) Threshing of seed crops.

The cost of harvesting seed is very much a function of the number of hours that the harvesting machine is used during the course of a season, and the efficiency of recovery of useful seed.

In all countries with an efficient seed industry harvesting machines are used for a greater number of hours than is commonly the case by our South Australian Seed Harvesters.

In Oregon extremely favourable weather and large scale operations ensure that each harvesting machine is used from between 300 and 700 hours per year as against a figure of 100 hours or sometimes even less in South Australia.

In Europe all herbage seeds are grown on farms which in addition to the acreage of seed crops have many times that acreage of cereal crops which ripen at a later time than the grass seed crops. This enables harvesting equipment to be used for a very much greater length of time than that required to harvest the grass seed.

Despite the relatively rainy conditions common in the European and British harvest time, the fact that crops are ready for harvest over a period from mid-July until about mid-September ensures that a reasonably large number of hours of work are available for each harvesting machine and so ensures the lowest possible costs in that region. Costs which are currently less than those achieved by many South Australian seed producers.

A visit was made to Mr. Martin Nellist at the National Institute of Agricultural Engineering to try and establish the reasons why relatively minor periods of cool damp weather in South Australia bring the seed harvest to a complete halt, whereas in Britain it seems practicable for grass seed harvesting to proceed in conditions quite impossible in South Australia.

This issue was not satisfactorily resolved but it was felt by Mr. Nellist that perhaps the equipment being used by many of our farmers who find difficulty in keeping it working during inclement weather was due to the obsolescence of the machines used by our farmers. Some hints of ways thresher settings can be made to handle damp crops were obtained.

With the relatively good economic climate for farming in Britain farmers maintain a modern plant for all farming operations and machines which are still in use in South Australia after 20 years or so would not be found in Britain.

A visit to a practical seed grower in company with Mr. Gareth Gwynn of N.A.A.S. produced similar results. The farmer visited could not conceive how we would find any difficulties in handling the harvest of grass seeds under the sort of conditions we have in Australia other than that we would not have the machines of the modern design available in Britain.

In Oregon the discussions on this issue were centred primarily around the radical new development taking place in the Agricultural Engineering Section of the U.S.D.A. Group of Engineers working on the University of Oregon campus at Corvallis.

The machine being developed relies on the principal of rubbing out seed between two moving belts; the one moving something like 7 times as fast as the other thereby producing a rubbing action, as against the previous threshing principle of threshing by impact, with a fast moving threshing drum removing seed by impact.

After preliminary work the previous year on Mark I of the mobile field version of this development, a new Mark II model was in an advanced stage of modification for testing more fully during the harvest of the 1971 northern hemisphere summer.

The machine had in fact been used very briefly late in the 1970 northern hemisphere summer for harvesting field bean seed and as a result of this experience some further modifications had been incorporated in this machine.

Whether this development will supercede the traditional threshing machines is too early to say but it is one which must be kept under close scrutiny as it is conceivable that for difficult to thresh crops and difficult weather conditions that this principle will in fact result in a very much higher recovery of seed in a single pass than is possible at the moment using the conventional type cereal harvesting machine modified to handle grass seeds.

Double threshing either by two separate passes or by having two separate threshing machines built in to the one machine has been quite a common practice in Oregon for a number of years but as yet has not been used to any notable degree in South Australia for grass seed harvesting. The belt thresher may in fact eliminate the need for having two separate threshing operations in many crops.

INVESTIGATIONS INTO SEED PROCESSING

Seed processing is the largest individual cost facing seed grower on a per acre basis in South Australia. It is therefore an area which is likely to be capable of considerable cost saving as a result of investigation and research.

In addition to the direct cost of seed cleaning there is the indirect cost associated with less than optimum recovery of good seed in the clean fraction.

The matter of the effective recovery of the maximum amount of sound seed from farmer's harvested samples has been effectively dealt with in both the Netherlands and in France by a service provided in their seed testing laboratories coupled with a contract based on results obtained in the seed testing laboratory.

The basis of seed growing in the Netherlands and France has been that the farmer is paid on the poundage of seed calculated on the basis of the weight of uncleaned seed delivered for cleaning by the percentage of recoverable seed determined by the seed laboratory from this sample of seed.

Both in France and the Netherlands the seed laboratory have equipment for rapidly determining the recoverable seed. It would appear that the majority of seed merchants have in fact achieved a level of recovery very close to that indicated by the seed testing laboratory.

In Britain while the normal contract is not based on the percentage of recovery of good seed determined by an outside laboratory, seed cleaning charges are in fact set as a part of the normal contract for growing seed. In the case of varieties of official breeding stations the only means by which basic seed is released by the National Seed Development Organisation to seed firms for multiplication, is after the standard contract between merchant and farmer is signed.

Standard Cleaning Charges. (These charges and scheduled weeds remain the same as in Seed Notes No.79 for 1969.)

Seed crop	Charges in pence per lb. at the initial purity stated					
	2.83** 2½d.	2.26 2d.	1.70 1½d.	1.41 1¼d.	1.13 1d.	0.85-1.13 ¾d. to 1d.
Cocksfoot	Up to and including 70%	Over 70% under 80%	80% or over, under 90%	90% or over*	-	90% or over+
Ryegrasses, meadow and tall fescue)	Up to and including 75%	Over 75% under 85%	85% or over under 98%	98% or over*	-	98% or over+
Red fescue	Up to and including 75%	Over 75% under 85%	85% or over, under 95%	95% or over*	-	95% or over+
Timothy	Up to and including 80%	-	Over 80%, under 98%	98% or over*	-	98% or over+
Red and white clover	-	-	Under 98%	-	98% or over+	-

* These charges apply if the content of scheduled weeds (see below) is over 0.5%.

\+ These charges apply if the content of scheduled weeds (see below) is less than 0.5% but in the opinion of the merchant and with the agreement of the grower, an impurity and/or inert matter should be extracted to render the sample marketable. Otherwise, no charge.

It is anticipated that revised cleaning charges will be introduced for seed from the 1971 harvest.

Commercial cleaning plants were visited in Britain and Denmark to see the latest developments in seed cleaning technology. One visited was the North Waltham plant of Smith Bros., (Basing stoke) Limited. This plant was first operated in July 1967 and occupies a floor area of 22,000 square feet. It is mainly used for cereal seed processing but a considerable quantity of herbage seed is processed as time permits.

The main cleaning plant is a Linde Seedmaster which is in series with two banks of indent cylinders.

** = cents Australian.

In the case of herbage seeds a Boby extra clean separator is used as a finishing machine and is coupled with two banks of indent cylinders, four cylinders to each bank. The plant is operated with a staff of five men who between them perform all the functions but no particular man exclusively works any particular part of the operation.

The D.L.F. organisation in Denmark employs Mr.Oversen to organise adequate seed cleaning capacity for the seeds being handled by this firm.

Mr. Oversen has been responsible for the investment of over one million dollars Australian in new plants and new equipment for existing plants during the past five year period. I would feel from an inspection of the basic type of plant being installed at the moment that this firm has in conjunction with Delta Maskiner of Copenhagen, developed the most advanced cleaning line in use anywhere in the world.

This plant is on a single floor enabling one operator to effectively control the operations of aspiration, screening, rethreshing, separation by mean of indent cylinders and filling bulk bins all on the one level.

All movement from machine to machine and recycling of appropriate fractions is performed by means of air lift conveyors.

With one minor exception of one particular category of seed (a light fraction of good seed) which is handled in bags, all seed is brought to the machine in bulk boxes and taken away from the machine in bulk boxes, while all offal is removed by under floor horizontal conveyor.

The overall cost of the machinery plus all the additional conveying systems but not including the cost of the building amounts to 270,000 Danish Crowns which on current rates of exchange amounts to about $32,000 Australian.

It is considered by D.L.F. that there has been considerable advances in the design of the various basic machine components of a cleaning line in recent years and that it is essential to write off cleaning machinery fairly rapidly to enable the very best machines to be installed as they become available.

The ultimate aim of the firm D.L.F. is to develop a seed production system whereby their cleaning plants can be so orientated in relation to the seed multiplication by farmers that one set of machinery can be reserved for each variety of seed being multiplied.

The only conclusion to be drawn from investigations into seed cleaning operations made during the course of this trip is that the cleaning operation in South Australia is extremely inefficient for several reasons.

1. That there are many small scale plants which operate well below full capacity in terms of number of hours per year utilized.

2. That most of the machinery is small and much of the machinery is obsolete.

3. That the existing machinery is not at all well matched up for the various purposes and generally is archaic in terms of conveying systems from machine to machine.

4. That the percentage of good seed which is removed in offal or as second grade seed could be much greater in South Australia than is now achieved in the best cleaning plants overseas, another likely very large burden of cost to the seed producers already high cost structure.

The only solution to this problem would appear to be amalgamation of all cleaning operations in South Australia into one organisation with sufficient capital resources to enable one modern cleaning line to be installed which could cope with the entire South Australian seed harvest at the moment without any difficulty whatsoever.

INSPECTION OF SEED GROWING OPERATIONS

During the course of the visit, as the opportunity arose, inspections of seed crops in company with seed growers and officials or University personnel was made whenever possible.

The seed crops in Denmark in particular were particularly intriguing in that at the time of my visit early in April they had barely begun growth following the winter. It was incredible to think that crops with only a small array of green leaf could in fact grow to the extent that the yields of seed in excess of 1,000 lbs per acre could be harvested in less than four months from the commencement of growth following winter.

The production technique of grass seed in Denmark is one of establishing the crop under a barley crop and taking a grass seed harvest in the year following the crop or perhaps the two years following the crop. If in the year following crop the seed crop is not good enough, it may be used for fodder. Herbicides are only used against broad leafed weeds and generally this is all that is required.

Problems are occurring with Agropyron repens. A very low ceiling limit is placed on it in the British Market. Much seed previously grown in Denmark is now being grown in Britain for this reason.

In Oregon grass seed crops were well advanced at the time of my visit towards the end of April. The most impressive feature of the Oregon crops was their virtual freedom from any contamination either other crop or weed varieties. Great pains are taken by the seed grower to achieve this status. Fence lines are treated with total herbicides and spot spraying of other crop and weed plants are widely practised where a few remaining plants were left following a comprehensive overall herbicide program.

It was interesting to see the "Swamp Buggies" an Oregon development at work spraying and fertilizing waterlogged fields of grass crops.

The swamp buggy is a rubber tyred vehicle with very large low pressure tyres which enable it to work over saturated fields without causing any significant damage. These have as a rule interchangable spray tanks or fertilizer bins so that the field operations which must be done during the winter and spring period can be accomplished irrespective of soil conditions.

THE CHARCOAL HERBICIDE TECHNIQUE OF SEED CROP ESTABLISHMENT

The technique of protecting seed sown in rows by a narrow band of activated charcoal placed on the soil surface immediately above the row of seed to intercept a spray of the herbicide Diuron in that area but allow the Diuron to have its normal herbicidal role for the unprotected surface area of the soil between rows has been developed during the past four years in Oregon.

The original idea of using activated charcoal for protecting crop plants from herbicide was not in the application to the grass seed situation. However, it is thought that this application is now a major one for this particular technique.

During 1970-71 establishment year, that is the autumn and spring a total of approximately 10,000 acres of grass seed crops were established using this technique in the Willamette Valley of Oregon.

The technique allows autumn establishment to be successful whereas in the past, in Oregon, autumn establishment has been very risky because of the great array of weeds that are encountered using this time to establish grass seed crops, other than annual ryegrass, which because of the high seeding rate used is capable of handling this competition.

Using the Charcoal technique it is now possible to get a full crop or something approaching full crop from many grass seed species and varieties in the year of establishment, thereby saving an average of something like $15 an acre for each year of harvest for establishment costs as against the cost incurred when the year of establishment is not a harvest year. This is based on amortising establishment costs over a period of six harvest years following the year of establishment.

This technique also permits the production of other crop free seed and virtually weed free seed in the year of establishment particularly where spot spraying of isolated plants of crops and weeds is practised. High premiums are available for weed and other crop free seed of many grasses particularly if destined to be used in lawns.

FIELD BURNING AND THE "BLACK SPRINGS" SYNDROME

Field burning of grass seed crop residues was introduced into the Oregon seed industry about 25 years ago as a means of controlling diseases afflicting the seed industry, particularly "blind seed" disease of ryegrass.

The success was so overwhelming that field burning of all grass seed crops has been standard practice since that time.

Burning produces a major pollution problem in the Willamette Valley which is meteorologically one of the worst areas of U.S.A. for air pollution.

Because of this a vigorous discussion leading to adoption of anti-pollution laws of increasing stringency has taken place in Oregon.

The whole question of the disposal of crop residues is being looked at again, or in many instances looked at for the first time in a serious way because of the political pressures against field burning.

Currently an annual budget exceeding $300,000 U.S. is being applied to the multifarious aspects of this problem.

Dr. Hardison a plant pathologist of the U.S.D.A. Agricultural Research Service at Corvallis was an original proponent of field burning for disease control and is actively involved in research currently being undertaken to find ways and means of combatting smoke pollution.

During the course of his service at Corvallis he has studied the effect of fire on the grass seed nematode a factor in the "Black Springs" syndrome and has found fire to be an effective means of control.

He has as a part of his current investigations produced an apparatus for the study of the effect of heat on plant pathogens and is prepared to examine the effect of heat on Nematodes in galls collected from fields producing the Black Springs Syndrome.

He is quite confident that fire correctly applied will eliminate this condition in South Australia.

One of the many facets being studied in the field burning investigations is burning crop residues without smoke production. A mobile field burner has been developed and with the experience during the summer of 1971 should be developed sufficiently for commercial production to be possible. Anticipated cost of burning using the machine is $8 per acre as against 75 cents for open wild burning.

Although more expensive, the control of temperature possible by machine burning will most likely be recouped by better disease and weed control and less damage to the crop plants than is taking place in the case of open field burning.

The role of field burning in South Australia is as yet little exploited. It has been limited by the restrictions of bushfires legislation to being applied much later than is normal in Oregon where burning takes place as soon as practicable after harvest while conditions are hot and dry making for a fast fire with complete combustion.

GENERAL HERBICIDE RESEARCH PROGRAMME O.S.U.

Oregon State University at Corvallis is a major centre of herbicide research and the training of weed control personnel.

Currently there are about 6 staff and 20 post graduate students involved in this programme.

A major facet is the screening for chemical companies on a confidential basis of new chemicals. The work is carried on in Oregon, South America and Hawaii so that the most rapid progress possible is attained.

Graduate students from O.S.U. are sought after by the chemical companies and no difficulty has been experienced by Ph.D students in finding remunerative employment, in a generally depressed employment situation in the U.S.A.

Because of the high status of weed work at Corvallis and the fact that Western Oregon is climatically similar to the higher rainfall areas of South Australia O.S.U. should be considered as a possible venue for post graduate training of staff of the S.A. Department of Agriculture.

MINOR ISSUES WHICH CAME TO LIGHT DURING THE COURSE OF THE OVERSEAS VISIT.

Private Plant Breeding Establishments.

An opportunity occurred to visit the D.L.F. and F.D.B. Plant Breeding Station at Store-Heddinge where Dr. K.J. Fransden is the leader of a small plant breeding team.

The total facilities available at this station which has only been purchased and developed during recent years are very considerable and exceed anything to be seen in the way of official plant breeding stations in Australia. Laboratory facilities of a very high order of sophistication are provided and occupy a floor area of about half that available at the Northfield Research Laboratories. Glasshouse facilities would be equal in floor area at least to all glasshouses on research institutions in South Australia. A notable unit was a very extensive facility for cross pollinating sugar beets in isolation from each other. Each unit is supplied with filtered air. There were about 50 pollen proof units in this facility.

Fodder beets have traditionally occupied a major part of the plant breeding efforts in this establishment. However recently interest has been taken in breeding lawn grasses and this is indicative that lawn grass breeding is becoming more extensive in many places in Europe and North America where increasing affluence allows a greater use of lawns and with increasing knowledge, the standard aimed at in lawn performance is increasing considerably.

It is quite apparent from the visit to this institution that private plant breeding is something which cannot be considered to be something that is inferior to the sort of standards achieved by official plant breeding stations.

While this particular institution is an example of a large and well capitalised breeding institution the establishment of Mr. Harald Littman at Malente-Gremsmuhlen is one which indicates something approaching the other extreme in plant breeding in the private field where one individual has a part time operation in conjunction with farming and seed merchant activities. Mr. Littman has bred a number of varieties of Kale and Vetch which have found acceptance in Germany and to some extent neighbouring countries.

In this case a very minimum of facilities which would be considerably inferior to those available to the plant breeding group at Northfield were all that was available. Chemical work associated with an evaluation of the nutritive value of the plants being bred was handled by an outside agency.

Organisation of a Research Centre for Crop Research

The farm associated with the Farm Crops Department of Oregon State University situated a few miles from Corvallis is in my opinion the finest example of an organisation for handling agronomic experiments for non resident research personnel.

Dr. Wheeler Calhoun is in charge of this station.

His work load divides up as follows:

1. The reason for his appointment to the staff of the Oregon State University is the operation of this research unit which provides land, buildings, equipment and some assistance in manpower for persons who wish to conduct experiments on this station.

2. As a result of his smooth running of this establishment and his special talent in accounting he is also responsibe for the development and control of the financial budget for the whole of the Farm Crops Department of O.S.U. at Corvallis.

3. To enable him to have some interest in research work he maintains a small research programme in the area of oil seed producing crops particularly, oil seed rape and the genus Limanthes a genus native to Oregon.

The farm acreage which is entirely devoted to experimental growing of crops of one sort and another with no livestock is 283 acres. Although no fences occur on the farm it is for reference purposes divided into five fields and each field is divided into a series of ranges which are strips approximately 3 chains wide by various lengths ranging from 620 feet to 1120 feet.

Areas appropriate to particular experiments are allocated within a particular range. Following conclusion of a particular experimental programme in a particular range the area is rendered suitable for further experimental work by being sown to Du Puits lucerne. This is cut with a forage harvester from time to time and the herbage allowed to rot back into the ground. The period under lucerne is usually two years and this then allows the particular treated range to return to an experimental programme in the following years.

Dr. Calhoun has made a particular study of the provision of facilities, land and labour for experimenters and used part of his sabbatical leave several years ago to visit the majority of similar facilities in the United States to ensure that he was well abreast with the best developments in this field.

It would appear that the Hyslop Agronomy Experimental Farm is a model for us to follow on all our research centres for providing facilities for both permanent and visiting personnel wishing to experiment on these farms.

Appropriate charges are made for all services provided, being debited against particular experiments. Appropriate means of requisitioning for machinery are provided, supplies of numerous minor items of equipment are on hand and can be obtained at cost. All requests for use of facilities, staff, land etc., must be on the appropriate form and in writing and for some operations the presence of the person in charge of the experiment or his delegate is necessary before any work will be conducted by the farm staff.

The whole of the policies for the use of land, facilities, equipment and services at the various agronomy farms of the Oregon State University are all in a readily available printed form so that there is not the slightest need for any misunderstanding of the facilities that are available and the conditions under which they are available on these farms. A copy of the policy statement is attached as Appendix (1).

It would appear that the operations of this farm by the Oregon State University should be closely studied by our research centres branch and indeed any branch which is involved with providing services for experimenters, as a model of this type of service.

Oil Seed Rape Investigation - Oregon

The Willamette Valley region of Oregon has many close similarities of the higher rainfall areas of South Australia. The

rainfall is seasonal with virtually no rain during the three mid-summer months. Winters are very wet as the total average rainfall is in the region of 35 - 40 inches. Much of the bottom of the valley is a former lake bed so that topography is rather flat and because of the heavy nature of the soils there is an accumulation of surface water during the winter months. Within this context a serious investigation into the possibilities of developing oil seed rape as a commercial crop has been underway for a number of years.

The interesting feature of this work is that despite the fact that they are able to achieve yields of oil seed rape in the region of 2,500 to 3,000 lbs per acre and despite the fact that this has been consistently achieved over a number of years it was not felt at the time that I visited Oregon that the evidence was as yet sufficiently conclusive that oil seed rape could be recommended as a commercial crop to the Oregon farmers.

There is a major weed problem as would be expected, of annual ryegrass, which is universally distributed through the Oregon area. This is effectively dealt with by three pounds of Eptam per acre costing $US15. Nitrogen fertilizer in the form of sulphate of ammonia at the rate of 100 lbs of pure N per acre is applied in the spring.

Dwarf Essex a variety of rape used for grazing purposes in South Australia belonging to the Brassica napus group has proved to be the highest yielding variety in the work at Corvallis. Other species examined the course of the work have been Brassica compestris Brassica nigra and Brassica juncea. Varieties of all these species have been collected through the U.S.D.A. or directly from breeders in Europe.

A small amount of breeding work is being prosecuted during the course of these investigations.

The other oil seed crop receiving attention is Lamanthes species. This genus has an oil which has a very long chain fatty acid which produces an oil suitable for use in the synthetic rubber and in the continuous casting of steel industries. As yet this particular project has not produced the commercial crop either.

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Visit with Mr. Kevin Boyce on Leave from the S.A. Department of Agriculture.

Mr. Kevin Boyce is studying for his Doctorate of Philosophy at Oregon State University at Corvallis. He has had at the time of this visit been in Oregon for about seven months during this time he had with his family settled into the Corvallis environment very well.

In conversation with various members of the staff of the Farm Crops Department in which he is working he was always regarded highly.

He has shown great energy in getting a large experimental programme going mainly in controlled growth facilities, and mainly concerned with work aimed at isolating and identifying a germination inhibiting substance which is produced in wheat grains of some varieties when grown in seasons of low temperatures during the ripening period of the grain in Oregon.

His whole area of study will be concerned with the development and maturation of seed which is complementary to his earlier studies for his Master's Degree which concerned the initiation of reproductive parts through the stage of anthesis of the grass Setaria sphacelata.

He is studying a considerable number of formal courses as is usually required in the case of American Ph.D's and is taking the opportunity of seeing the commercial seed industry of Oregon and indeed on student tours, of California as well, during the course of his prosecution of studies for the Ph.D degree.

Mr. Boyce was quite confident that he will be able to complete his degree and return to the Department of Agriculture early in 1973.

(E.D. Higgs)
ACTING PRINCIPAL RESEARCH OFFICER, AGRONOMY

APPENDIX I

POLICIES FOR THE USE OF LAND, FACILITIES, EQUIPMENT AND SERVICES AT THE AGRONOMY FARMS

Land Allocation

Each project leader in the Farm Crops Department who has need for land is allocated an area at Hyslop and/or East Farms for use in his field crop research program. Any request for additional land or change in allocation is to be made to the Farm Superintendent.

Personnel from other departments allocated land at either Hyslop or East Farm will be assessed a land usage charge unless otherwise agreed upon prior to the allocation of land.

Facilities and Their Usage

The various facilities located on the experimental farms are provided to serve the needs of many individuals. Therefore, to help prevent conflicts, it is necessary that request for use of these facilities be scheduled AT LEAST ONE DAY in advance through the Farm Superintendent. The following is a list of facilities that need to be scheduled for your usage:

1. General lab (if needed for more than a day at a time)
2. Seed cleaning and shelling room
3. Seed storage room
4. Driers
5. Space on drying lines
6. Bundle storage space
7. Threshing shed space

Space for the storage of research materials and supplies such as stakes, sacks, containers, etc., for current usage is available. These spaces are allocated by the Farm Superintendent on a long term basis to best serve the needs of the Department.

Use of all of the above mentioned facilities requires that individuals must keep their material in a neat and orderly manner and that they tidy up during and after using the area.

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Appendix I contd.

Materials and Supplies Available

Certain kinds of materials and supplies commonly used by several projects are purchased in quantities, usually at lower prices, and are available to projects at cost. Individuals using these items are on their honour to record pertinent information on record sheets found at or near the storage place of these supplies. The following is a list of items usually on hand at Hyslop Farm:

1. Petroleum products - gas, oil, grease and diesel fuel
2. Fertilizers - most common fertilizers (bulk storage at Farm Service)
3. Chemicals - most common weed killers
4. Pesticides - slug bait, DDT dust, aldrin, endrin
5. Lumber - plywood, stakes and some dimension lumber
6. Grain sacks and twine
7. Bolts, nuts, screws, washers etc.
8. Steel supply - flats, angles, bars and rounds
9. Paper products - tags, sacks

Small Equipment Usage

Several different kinds of small equipment, owned and maintained by the Farm Crops Department, are available for use by individuals in their respective research programs. There is considerable demand at times for small equipment; consequently, it is necessary to request for usage through the Farm Superintendent AT LEAST ONE DAY in advance.

Those who use this machinery are required to know how to operate it properly and use it in a prudent manner. The mechanic, farm foreman, or farm superintendent are all qualified to instruct you in the proper usage of any of this equipment.

Please record the use of this small machinery on the "Record of Equipment Usage" sheet located at the desk in the small machinery shed. A minimum charge is made for usage of this equipment for its maintenance.

The following is a descriptive list of equipment that needs to be scheduled and has a charge for its usage:

Appendix I contd.

1. Gravely Tractor, 5 HP, with — $1.00 per hr.
   a. sickle bar (center mount) with 3' width of cut
   b. rotary mower, 30" width of cut
2. National Mower, 38" sickle bar — $0.75 per hr.
3. Arrens Garden Tiller with 20" width of cut — $1.25 per hr.
4. Harvester (Simplicity Tractor) 30" width of cut with — $1.25 per hr.
   a. chopper for harvest of forage plots
   b. seed harvester with pan to collect the whole plant.

The following kinds of equipment are available for use without charge or necessity to record usage:

1. Weed burner, hand, 2 gallon capacity
2. Sprayer, hand, 2 gallon capacity
3. Planter, hand, as follows:
   a. Planet Jr. with either disc or shoe opener
   b. "V" belt with shoe opener
4. Land marker, hand, adjustable to any 6" spacing
5. Wheel hoes
6. Garden hand tools such as hoe, rake, shovel, pitchfork, axe, pick, etc.

All of the above listed equipment is to be returned promptly after it has been used.

Irrigation Equipment Usage

Certain land areas at both Hyslop and East Farms are provided with irrigation facilities. Because of the heavy demands for these facilities, it is imperative that all needs for irrigation be scheduled AT LEAST THREE DAYS in advance through the Farm Superintendent.

Appendix I contd.

The irrigation pipe, sprinklers and fittings are stored adjacent to the respective wells. Please return all irrigation equipment promptly after you are through using it.

All individuals using the irrigation system are requested to enter appropriate information on a record sheet located in each pump house. Projects from other departments will be charged 30 cents per hour for use of the irrigation system unless some other agreement has been made prior to its usage.

Request for Services

The primary purpose of the farm staff is to provide those services necessary for the efficient functioning of the various field crop research programs at the agronomy experimental farms. In order to provide for such services, it is necessary that the Farm Superintendent has adequate knowledge of each project's plans and that advance notice of services needed by each project be given. Therefore, early in the calendar year all project leaders are requested to submit to the Farm Superintendent an outline of services needed for the ensuing crop year. Then AT LEAST THREE DAYS prior to the actual date of need, a request must be made to the Farm Superintendent for services needed by the project. Any request for spraying, dusting or fertilizing must be written, not verbal. When any spraying job is requested, it is necessary that the project leader or his representative be present at the time the job is to be done.

The priority in performing services is determined by the Farm Superintendent based primarily on a first come, first served basis. All emergencies will be handled as effectively as circumstances and prior commitment will allow.

As plans are being formulated in the design of experimental plots and in their location in the field, individuals are cautioned to consider the operating width of farm machinery, the need for allowing sufficient border space for servicing and the layout of irrigation equipment to fit the plot design. As problems develop in the locating of plots in the field, or in determining the size and layout of plots in regards to width of farm machinery or irrigation equipment please feel free to consult the Farm Superintendent.

Appendix I contd.

The following list shows the width of equipment owned or leased by the Farm Crops Department:

A. Farm machinery

1. Disc - 10'
2. Harrow - 10'
3. Roller - 10'
4. Tiller - 72" cut
5. Drill - 8' planting space
6. Fertilizer spreader - 8'
7. Sprayer - 20' boom
8. Chopper - 5' cut
9. Combine - 7' - 3" header
10. Swather - 10' header
11. Binder - 8' header

B. Irrigation equipment

1. Space between laterals, 30' or 60'
2. Space between sprinklers, 20' or 40'
3. Nozzle sizes and capacity
   a. # 20 sprinkler - 1/8" nozzle @ 45# pressure = 3.04 G.P.M.
   b. # 25 sprinkler - 5/32" nozzle @ 45# pressure = 4.68 G.P.M.
   c. # 30 sprinkler - 3/64" x 3/32" nozzle @ 45# pressure = 6.48 G.P.M.

Notice to All Personnel

The speed limit for vehicle travel on the farms is 15 mph.

Appendix I contd.

Farm Crops Department.

LABOR AND EQUIPMENT CHARGES
TO PROJECTS

Equipment

Tractors	$2.00 per hour
Gehl Chopper (includes man and equipment hours)	4.50 per hour
Tractor Tiller (includes man and equipment hours)	5.00 per hour
Swather (includes man and equipment hours)	5.50 per hour
Combine (includes man and equipment hours)	8.50 per hour
Garden Tiller (Arrens)	1.25 per hour
Gravely Tractor	1.00 per hour
National Mower	1.00 per hour
Forage Chopper and Seed Harvester (Simplicity Tractor)	1.25 per hour

Labor

Foreman	$3.00 per hour
Mechanic	3.00 per hour
Tractor operators	2.50 per hour

Estimated Cost for Certain Field Operations

	Cost per acre
Seedbed preparation (plow, disc, harrow and roll)	$18.50 to 25.00
Fertilizing, spraying or dusting	1.85 to 2.50
Seeding with drill (8' drill width)	2.05 to 3.50
Fallow (only) for summer	7.50 to 10.00
Subsoiling	12.00 to 16.50
Leveling for seedbed	6.50 to 11.00

Appendix I contd.

SCHEDULE OF CHARGES TO OTHER DEPARTMENTS
FOR SERVICE AND FACILITY USAGE
AT HYSLOP AND EAST FARMS

1. Land usage charges - $45 per acre

2. Facility usage charge

	Min.		Max.
A. Limited use of facilities (per year)	$50	to	$100
B. Moderate use of facilities (per year)	125	to	225
C. Extensive use of facilities (per year)	250	to	500

3. Supervision charge

15% added to all labor charges

4. Irrigation charge

30¢ per hour

5. Drier charges

	Small Bins	Large Bins
Drying @ 80°F	.35 per hr.	.50 per hr.
Drying @ 100°F	.50 per hr.	.70 per hr.
Drying @ 120°F	.70 per hr.	.95 per hr.
Drying @ 140°F	.95 per hr.	1.25 per hr.
Drying @ 160°F	1.25 per hr.	1.60 per hr.
Drying @ 180°F	1.60 per hr.	2.00 per hr.