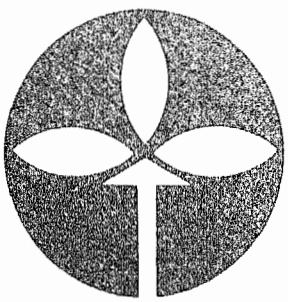

DEPARTMENT OF AGRICULTURE, SOUTH AUSTRALIA

Agronomy Branch Report

PLANT BREEDERS' RIGHTS

A discussion of some of the issues related to introducing Plant Breeders' Rights in Australia

E.D. Higgs,
Senior Research Officer (Agronomy Branch)

February, 1974.

Report No. 52

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PLANT BREEDERS' RIGHTS

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1. INTRODUCTION:

The issue of Plant Breeders' Rights has been brought to the notice of Standing Committee on Agriculture by a resolution of the last Australian Plant Breeders' Conference held in Perth, Western Australia, in 1971. The question is currently being looked into by the Department of Primary Industry as a result of a request from Standing Committee. The rate of progress of this enquiry is causing concern to members of the Seed Industry Association of Australia and the Federation of Australian Nurserymen's Association. At a recent seminar they resolved that the matter be again brought to the notice of the Minister of Primary Industry, the Attorney General and the Minister of Science.

The following discussion is aimed to assist in developing a policy regarding Breeders' Rights within the South Australian Department of Agriculture.

2. DEVELOPMENT OF THE CONCEPT & MACHINERY FOR GRANTING PROPRIETARY RIGHTS TO PERSONS WHO BREED OR DISCOVER PLANT VARIETIES:

The first country to implement a modern, comprehensive scheme for the granting of Plant Breeders' Rights was the United Kingdom. Their "Plant Varieties and Seeds Act, 1964" is a comprehensive Act to grant Plant Breeders' Rights and to generally control the trade in seeds and in some respects, the production of seed.

This Act was developed following a four year enquiry (1958-1962) by a Government appointed committee who delved thoroughly into all aspects of the trade in seeds. One of their stated reasons for recommending the concept of a Plant Breeders' Right was that if they were granted it would be possible for breeders to recoup some of the costs of breeding, and this would be an inducement to an increased effort in breeding.

At the time it was recorded that more scientific input into plant breeding had increased costs considerably so that they could not be readily recouped as a part of a seed firm's overhead expenses. Royalties on seed sales and other rights would give the additional recompense necessary to induce greater efforts.

It was also thought by the committee that British farmers had to rely to an excessive degree on varieties bred in other countries.

The committee of enquiry recommended against the granting of patents for plants. The nature of British patent law is such that some of the products of plant breeding were not or may not be eligible for patent rights. For instance, anything that occurs in nature certainly cannot be patented under British law, a law which is based on "The Statute of Monopolies" brought into being during the reign of James I, and whose interpretation is based on

a series of important legal decisions made at various times since that time. The patent law would have been expensive to apply to plants and legal uncertainties would have created many difficulties.

Rather than grant patents to a proportion of plants which may qualify for a patent and leave the remaining plants ineligible it was decided that an entirely new right should be granted to persons who breed or discover new plant varieties with appropriate levels of distinctiveness, uniformity and stability and comply with the rules regarding previous commercialisation. The "Plant Variety and Seeds Act, 1964" was therefore devised to give exclusive rights to breeders or authorise others to:-

(1) Sell the reproductive material of the plant variety.

(2) Produce the reproductive material of the plant variety in Great Britain for the purpose of selling it.

Some additional rights were also made available for special categories of plants where it was considered that the income available from (1) and (2) above was insufficient to give adequate recompense to the originator.

The British Act complies with the requirements of the "International Convention for the Protection of New Varieties of Plants". (The United Kingdom is a signatory). This enables certain advantages to be given in the United Kingdom to persons whose original application for Breeders' Rights is in another country, which is a signatory to the International Convention mentioned above. In particular, the date of lodgement in another country can be the priority date for consideration of a grant in Great Britain, if subsequently an appropriate application is made in Britain for a variety right within twelve months after the application was first made in another country.

The International Convention under which the United Kingdom and a number of other European countries operate provides that before it becomes operational, a minimum of five genera of plants must be included in any scheme at the outset, a further two must be included within three years and a further four within six years and the whole of the following within eight years:-

(1) Wheat
(2) Barley
(3) Oats
(4) Maize
(5) Potato
(6) Peas
(7) Beans
(8) Lucerne
(9) Red clover
(10) Ryegrass
(11) Lettuce
(12) Apples
(13) Roses

The Convention allows an alternative for oats, rice, and an alternative for roses, carnations. There is no limit to the number of genera which may be included in a scheme.

* Signatories are:- Britain, Denmark, The Netherlands, Federal Republic of Germany, Switzerland and Italy.

3. DEVELOPMENT OF THE SEED INDUSTRY IN THE UNITED KINGDOM & EUROPE:

To judge the relevance of the "International Convention for the Protection of New Varieties of Plants" and the United Kingdom and European legislation on Plant Breeders' Rights to the Australian situation, it is necessary to consider the development and nature of the seed industry, both in these countries and Australia.

In Europe the seed industry is very largely in the hands of private enterprise. The seed industry has developed steadily over a period of some hundred and fifty or two hundred years although the greatest developments have taken place within this current century.

There are two major types of firms, the proprietary and the co-operative firm. Of the two, the farmer-owner co-operative has set the pace in making improvements in the seed industry in Europe. The co-operative movement developed particularly strongly in Holland and Denmark, which were until relatively recently countries relying heavily on the export of agricultural products for a major part of their national income. In the second half of the 19th century with the extreme competition in the big markets, particularly in the United Kingdom resulting from the development of grain, meat and dairy produce, exports from North America, Australia and New Zealand, it was necessary for Dutch and Danish farmers to organise the purchase of their requirements for farming and the sale of their production in the most economic way possible. This was achieved by co-operative purchasing and co-operative marketing organisations. Among the requisites provided by these co-operatives were the seed requirements of their members. While initially breeding did not loom very large in the activities of these co-operatives a number of them have progressively increased their breeding activities and these provide a major competitive force in plant breeding operations for a number of important agricultural plants.

The proprietary firms have had to compete with the co-operatives and have been stimulated to more active breeding work by them.

In general these co-operatives and the privately owned seed industry have concentrated on breeding and merchandising seeds of the already well developed crops and pasture species.

Another category of breeding organisations are those which are independent but partly government supported. A particular example is the Swedish Seed Association which receives an considerable Government grant to assist its programme. In the initial stages it was entirely a privately arranged association for the production of superior plants.

In some special areas it has from time to time become apparent that the breeding activities of these commercial organisations were not encompassing to an effective degree, particular categories of plants. In some countries, notably Great Britain and Holland, breeding activities by non-commercial organisations has been of considerable significance. For example, the Welsh Plant Breeding Station (particularly for its work with herbage plants) and a number of breeding institutes in Wagengen in The Netherlands.

The European seed industry therefore consisted of a variety of organisations but was predominantly in the hands of non-institutional bodies during the period when the concept of granting Plant Breeders' Rights was being developed. The Breeders' Rights were thought merely to provide a stimulus to greater activity in the context of a fairly comprehensive number of existing breeding organisations which were covering all the important crops and many minor ones.

4. DEVELOPMENT OF THE SEED INDUSTRY IN AUSTRALIA:

The development of agriculture in Australia has been entirely based on the importation and development of crops first cultivated in other parts of the world. In the case of wheat the use of imported varieties ceased a very long time ago with the realisation that the successful development of the wheat industry of Australia required the breeding of varieties adapted to the degree of drought and a seasonal pattern of light and temperature which were not closely paralleled in other major wheat growing areas of the world.

Unlike in Europe where agriculture was left to fend for itself in the latter half of the 19th century at a time when North America and Australia were becoming increasingly competitive, agriculture in Australia was at that same time being actively fostered by the various governments. This assistance took several forms. In South Australia one of the significant moves was the appointment of J.D. Custance, an agricultural chemist, to become the first Principal of Roseworthy Agricultural College. This development of official interest in agriculture was in turn followed by the development of wheat breeding activities at Roseworthy and later the development of the South Australian Department of Agriculture. In other states similar developments of official interest in the improvement of agriculture took place with the result that increasing amounts of public money were channelled into breeding work aimed at extending and improving the area devoted to wheat production.

The various botanic gardens and their societies interested themselves in trying to develop other forms of agricultural production other than the predominant one, wheat. A wealth of plant material of all sorts of crops and pasture plants entered Australia as a result of their activities.

Perhaps one of the most important events of this early period was the recognition of the work of subterranean clover by A. Howard, a nurseryman and forist of Blakeston in the Adelaide Hills. This plant was largely developed to the commercial stages by his personal efforts.

With the founding of the Waite Agricultural Research Institute (initially a privately endowed organisation, but more latterly supported to a considerable degree by Government money) and the C.S.I.R.O., considerable plant breeding activities in herbage plants were initiated at the institutional level. A most significant de elopment was the formation of the Commonwealth Plant Introduction Service. A centralised service for importing germ plasm of plants of value to agriculture.

Another peculiarly Australian development significant to the development of the seed industry has been the method of financing agricultural research. The implementation of the concept of various industries levying their producers for the purpose of assembling funds to allocate to various research organisations has been of great significance, particularly in the past decade or so. Subsidies on a dollar for dollar basis are provided by the Commonwealth Government for some of these funds, notably the Wheat, Wool and Meat Funds. These funds have granted substantial sums of money to breeders and have encouraged the development of breeding by institutional breeders on a greatly enlarged scale for cereals and herbage plants.

5. CURRENT STATUS OF THE SEED INDUSTRY IN AUSTRALIA:

5.1 Breeding

As a result of the availability of public funds on a substantial scale the overwhelming majority of professional breeders are employed by public institutions in Australia (see Table 1 for a list of breeders, the crops they work on and the institutions to which they belong).

In the major crops the local breeding undertaken by institutional breeders is the principal source of improved varieties. Of the major Australian agricultural and horticultural industries of long standing only the vegetable industry appears to be still relying to a substantial degree on foreign varieties of recent breeding. Some of the newer crops such as oil seed rape, cotton and sorghum are also dominated by foreign varieties at the moment although this situation may change quite rapidly with the development of local breeding programmes already under way.

One area in Australia where private enterprises dominate the situation and are likely to continue to do so is in the area of hybrid seeds. (Their position is easily maintained because they only have to keep control of the parents). Another area is the ornamental horticultural trade dominated by nurserymen and amateur breeders.

It is very doubtful if it can be claimed for many crops that the level of breeding activity is sufficient to allow all the possibilities for improvement by breeding to be effectively exploited in the shortest possible time. The meagre range of crops grown in particular areas of Australia could be greatly expanded by more extensive activity. This aspect is more fully discussed later.

5.2 Multiplication

Unlike the seed industries of the United Kingdom and Europe and in some respects the United States of America where often all operations from breeding through to marketing of seed are under the control of the one organisation, Australia has very few integrated operations. The multiplication of improved varieties of seed is organised on somewhat different lines for various categories of seed. In the case of the major cereals the initial multiplication is usually organised by the breeder. A further generation may then be taken by either the breeder on his farm or appropriate government farms and this in turn is followed by registered growers who further multiply the seed for use by farmers.

In the case of cereals the amount of seed purchased by farmers from government farms or registered growers is usually only a very small fraction of their total requirement. The great majority of cereal seed is grown by the farmer himself.

In the case of herbage seed the breeder himself undertakes the production up to the stage of quite small quantities of seed but this is now increasingly followed by a contract multiplication of seed where the contract is between a professional seed grower and the breeder. This initial multiplication is followed by usually at least two and possibly three generations of further multiplication, all of which is sold through merchants and co-operatives or private seed firms.

In the case of herbage seeds a considerable proportion (probably in excess of half the total seed requirements) of most of the species being actively introduced or bred at the moment, is seed which is reproduced under a certification scheme.

Farmers generally purchase the great majority of their herbage seed requirements rather than grow their own.

5.3 Processing

The processing of seed in Australia has some unique features, particularly in southern Australia. Here the majority of the cereal seed is processed by mobile cleaning and treatment plants operated by a number of organisations. The largest, Alf Hannaford & Co., operates across Victoria, South Australia and Western Australia. Other similar firms have more localised activity.

Cleaning of herbage seeds on the other hand, is almost entirely by stationary plants usually owned by firms who clean on the basis of a fixed hourly fee or on the basis of a fee per pound of clean seed produced. Some larger growers have their own plants.

5.4 Marketing

In the case of cereals only a very small proportion of the total seed used by farmers passes through a marketing organisation. A certain amount is bartered between growers and only a small proportion is purchased by growers through seed merchants or directly from seed growers.

On the other hand in the case of herbage and all other seeds, the great majority of seed used passes through the hands of various types of marketing organisations.

5.5 Utilisation of seed by farmers

In the case of the cereals the utilisation of seed in relation to the amount of grain produced is of a similar order to most other parts of the world, our lower yields per acre are more or less in line with our lower seeding rates. This general rule would apply to many other categories of seed that are used but not to herbage seed. A distinctive feature about Australian use of herbage seed is the extremely low rates of seed used at extremely long intervals of time compared with the seed usage in Europe and North America. The result is that the total amount of herbage seed being used within Australia, despite the enormous acreages of pasture, is only a fraction of that used in Great Britain with a smaller livestock industry and a much smaller acreage of pastures.

6. THE DEFICIENCIES OF PLANT BREEDING IN AUSTRALIA:

It is not easy to judge whether the breeding work in any particular field is at an adequate level. However, it would seem that the level of expenditure per unit of production in the case of our cereal crops is of a similar order to the level of expenditure on breeding cereals in other parts of the world. This has in general been adequate, at most times, to provide an array of well adapted, highly productive, disease resistant varieties for most areas of the country. Exceptions do occur from time to time. A sudden up-surge of a new rust race may highlight the deficiencies of the current popular varieties. (See Table 2 for value of production of the important crops of South Australia).

An area where breeding activity is without doubt inadequate, is in the area of crops such as soya beans, sorghum, oil seed rape and other crops which have not been traditional major broad acre crops within Australia. It is difficult to judge whether the main reason for the current minor status of these crops is due to the innate unsuitable Australian environment, or due to the lack of action by breeders to fit these species to the Australian environment.

There is also evidence that in the vegetable field, despite the fact that vegetables have been grown on a considerable scale for the period that Australia has been settled, varieties adapted to mechanised production are not always available.

Judging by the desire to increase importation of new ornamental varieties, the level of breeding activity in Australia is most inadequate although some private and amateur breeding has taken place and has produced varieties of considerable merit.

7. ARGUMENTS FOR & AGAINST BREEDERS' RIGHTS IN AUSTRALIA:

7.1 Sources & nature of pressure for granting Breeders' Rights

There can be little doubt that the organisations who consider themselves most aggrieved by the absence of Plant Breeders' Rights in Australia are the nurserymen. Each year a considerable array of new varieties of the important ornamental plants are produced in various parts of the world, but very few in Australia. Much of the nursery trade appears to be in the sale of varieties with some novel feature, or alleged novel features which attract

buyers. The current arrangement (where any arrangements are possible) for the acquisition of new overseas varieties, involves the payment of a flat fee for the right to propagate and sell a particular new cultivar. This may be a completely unsuitable basis for doing this sort of work, where the ultimate demand for a variety is not at all clear, and where a large sum is asked for the variety. The result is that the cautious nurserymen do not undertake this type of work. A royalty on sales would be a far more attractive prospect to the Australian nurserymen. However, without Breeders' Rights this is not attractive to the seller of the foreign varieties.

It is alleged that many foreign breeders will not licence the reproduction ofaany of their varieties in Australia because of the inability of any licencees to police the pirating of these varieties by unauthorised persons. This of course, will be a continuing problem, irrespective of whether Australia does not or does have Breeders' Rights. The breeder in countries with protection still has to protect his interests by normal civil law.

A section of the cut flower trade has also brought pressure to bear. A particular example is in the orchid trade. Breeders of superior lines will not part with them to other producers of cut flowers without appropriate royalties made possible by Breeders' Rights.

The professional plant breeders have also pressed for a thorough study of this issue. There is evidence of a range of attitudes within the professional group. Some who are supported by public funds or funds provided by the end users (e.g. the State Wheat Research Trust Fund) see an element of injustice in asking farmers who have already contributed funds for breeding to have to continue to provide money in the form of royalties to successful breeders.

7.2 Difficulties in obtaining genetic material

One of the difficulties currently being encountered by Australian breeders, although the level of difficulty varies considerably from crop to crop, and from breeder to breeder, is the acquisition of important new genetic material from overseas. The granting of variety rights has increased the commercial value of various non-commercialised varieties. Breeders are less willing than formerly to part with material to other breeders, and it seems particularly to breeders in Australia. At one time it appeared that at least at the international level institutional breeders and major breeders in the private field readily exchanged material, in the same manner as there is a free exchange of ideas and results between workers in most scientific fields. However, there is evidence that there is no longer the case. It is felt by some breeders that this difficulty would be reduced if we have Breeders' Rights in Australia. However, there seems little logic in all this. In part this development can be explained on the basis that breeders may wish to withhold material from the Australian market until such time as Australia grants variety rights in the hope that they will be able to obtain them within Australia. Other countries have disqualified varieties from Breeders' Rights in cases of prior commercialisation, unless the prior commercialisation had been in a country with reciprocal rights and provided the right was given less than one year ago. It is not envisaged that this

difficulty in importing commercial quantities of new cultivars granted Breeders' Rights in other countries will be a lasting one if Australia makes a clear statement to the effect that it will initiate Breeders' Rights or alternatively that it states categorically that it has no intention of introducing variety rights for a substantial period of time.

7.3 Cost of implementing Breeders' Rights schemes

If it was not for the cost in actual money terms and in the use of technical manpower, the argument against the early introduction of a variety rights scheme in Australia would be greatly diminished. However, these schemes are expensive to operate, particularly if they are along the lines of the "International Convention for the Protection of New Varieties of Plants".

Under this scheme the varieties have to be carefully compared with a complete collection of varieties which were in commerce or which were known to exist at the time the scheme was introduced. This requires in most cases a very comprehensive classification and indexing of all existing cultivars and then a careful comparison of any newly submitted cultivar with the pre-existing cultivars. Where there is a large number of cultivars and an adequate fee is charged, the income from fees can cover much of the cost involved in compiling the index, and comparing new varieties for distinctiveness. This has been the situation in Britain where in most categories of plants brought into the scope of the variety rights, large numbers of varieties are coming forward so that the expenditure can be met by a comparatively small fee for each variety submitted.

With this type of approach the granting of a variety right is relatively simple as far as the originator is concerned and inexpensive and unlikely to require expensive litigation. Should alleged infringements of the rights occur, a special tribunal has been set up unrelated to normal legal processes to handle the situation in the United Kingdom.

The United States has set up another system of granting rights to breeders which relies entirely on a description of the variety. The preparation of an adequate description is costly to the breeder and should litigation be necessary to defend the right, and this is highly likely, then heavy costs will also be involved at this point.

7.4 Alternate incentives for stimulating plant breeding

It is not to be thought that the granting of variety rights is the only means by which an adequate level of breeding activity can be attained, any more than the granting of copyrights to authors necessarily results in an adequate level of writing taking place. The precedent has long been set, both in the plant breeding and in the writing fields, for alternative procedures to be followed to achieve particular objectives.

A consideration of Table 2 listing the current crops values in South Australia indicates that for many crops the level of royalties on seed or propagating material necessary to sustain even a modest sized breeding programme, would be very considerable. It is highly unlikely that even if variety rights legis-

lation is implemented in Australia that the breeding activity in any other than the major crops, in which breeding activity is already adequate or at least considerable, will be substantially changed from where it is at the moment and that to get breeding in these deficient areas of minor crops it will be necessary to provide funds to sustain breeding programmes for many years before a crop is developed to the stage that income from Breeders' Rights royalties would in any way be an adequate recompense for the level of breeding necessary for fast progress.

8. LEGAL MATTERS WHICH REQUIRE CONSIDERATION:

The concept of a special proprietary right for breeders as opposed to the type of right granted to inventors and other originators by means of patents and copyrights, was not in the minds of the people who drafted the Australian Constitution. The result is that under the terms of the Constitution, while the Australian Government may make laws for the peace, order and good government of the Commonwealth in respect to a variety of matters, including copyrights, patents of inventions and designs and trademarks, there is no suggestion that the Commonwealth Government has the right to make laws in regard to Plant Breeders' Rights.

The situation then must be that right to do this resides within the powers of the states, the holders of all the powers not specifically provided to the Commonwealth in the Constitution.

It is unlikely that separate Plant Breeders' Rights' schemes operated by the states would be acceptable. To establish a workable scheme it would be necessary for at least several of the states to transfer to the Commonwealth, by appropriate state legislation, powers which would enable matching Commonwealth legislation to become lawful. Because of this apparent legal situation it is desirable that the matter of Breeders' Rights be thoroughly discussed within the Government of South Australia so that only those powers covering those categories of plants for which the State desires to pass to the Commonwealth, powers to grant rights, should pass.

Should Australia develop and apply suitable legislation for granting variety rights, in the initial stages at least, there can be no doubt that this will, among other things, prove to be a means by which royalties will have to be paid for an increasing importation of overseas varieties, far in excess of any immediate income that is likely from Australian bred varieties eligible for rights in other parts of the world. This issue of the cost of importing technology has been given some airing in recent times, particularly as a result of legislation passed in Mexico not specifically dealing with plant material, but dealing with the importation of technology from abroad in general, and some of their arguments can be applied to the Australian scene.

With the exception of the major crop plants which are already being subjected to breeding activities of a sophisticated kind and at a level of intensity at least comparable to that being applied in the most advanced overseas countries, the standard of plant breeding activity and plant propagation in Australia is very low and can be considered quite comparable to the levels in the so-called developing countries.

This level is such that those who are importing and paying for imported technology are in a very poor position to assess the value of this imported technology or to make the best possible bargains for exploiting this technology. The Mexican legislation has been designed to set guidelines to enable the Mexican citizens to obtain a better deal in relation to the quality of material imported and the terms under which it is imported. In considering Australian legislation on Breeders' Rights, it would be necessary to take these arguments into consideration and make provisions to adequately protect Australia's interest. A brief outline of the sort of requirements now necessary in Mexico are given in Appendix 1.

As Australia has trade with both European and North American breeders and originators and has some prospects of producing plants which could be granted Breeders' Rights in either or both of these two areas, serious consideration has to be given to framing legislation which will allow easy access to both Australian and overseas breeders to the reciprocal countries. This may not be easy and would certainly require careful consideration by appropriately trained legal people. Rights may be granted to non-nationals in the United Kingdom providing they have an address in the United Kingdom. In the United States rights can only be granted to non-nationals if there is equal legislation accessible to United States citizens in the country of the non-national applicant.

9. CONCLUSIONS & RECOMMENDATIONS:

While the issues concerned with Breeders' Rights have received consideration by the writer for the past seven years or so, they have been particularly orientated to the implications in respect to herbage seed. To consider in depth, broader issues involving all classes of seeds and plant propagating material will require time and effort by people with a wide range of experience and expertise. Without the consideration of the widest possible range of plant classes by people of wide ranging interests and expertise the quality of any conclusion will be less than adequate.

It is not considered that this document is any more than an indication of some of the issues involved, considered at a relatively superficial level. It is recommended that this subject be more actively considered than in the past. It is suggested that an inter-branch committee be constituted covering the widest possible range of interests with the objective of making an in-depth study of the issues and making firm recommendations for a policy to be followed by the Department of Agriculture in this matter.

Table 1: Professional Plant Breeders of Australia

Crop	Breeder	State	Institution or Firm	Location
Wheat	D. Rosser	Queensland	Department of Primary Industries	Hermitage
	P.S. Brennan	Queensland	Department of Primary Industries	Toowoomba
	M.C. Cox	Queensland	Department of Primary Industries	Toowoomba
	J.R. Syme	Queensland	University of Queensland	Toowoomba
	R.J. Fletcher	New South Wales	Department of Agriculture	Sydney
	R.H. Martin	New South Wales	Department of Agriculture	Temora
	M. Kahn	New South Wales	Department of Agriculture	Wagga Wagga
	A.T. Pugsley	New South Wales	Department of Agriculture	Wagga Wagga
	E.P. Baker	New South Wales	University of Sydney	Sydney
	J. Gyarfas	New South Wales	University of Sydney	Sydney
	N.H. Luig	New South Wales	University of Sydney	Sydney
	R.A. McIntosh	New South Wales	University of Sydney	Sydney
	I.A. Watson	New South Wales	University of Sydney	Sydney
	I.L. Gordon	New South Wales	University of Sydney	Narrabri
	C.J. Driscoll	New South Wales	University of New South Wales	Kensington
	P. Wilson	New South Wales	DeKalb Shand Seed Co. Pty. Ltd.	Tamworth
	M.J. Archer	Victoria	Department of Agriculture	Horsham
	J.A.M. Brown	Victoria	Department of Agriculture	Horsham
	L. O'Brien	Victoria	Department of Agriculture	Horsham
	R.M. Young	Victoria	Department of Agriculture	Horsham
	P.H. Debrett	Victoria	Department of Agriculture	Werribee
	B.R. Whan	Victoria	Department of Agriculture	Werribee
	G.M. Halloran	Victoria	University of Melbourne	Melbourne
	G.J. Hollamby	Sth. Australia	Roseworthy Agricultural College	Roseworthy
	A.J. Rathjen	Sth. Australia	Waite Agricultural Research Inst.	Glen Osmond
	K. Shephard	Sth. Australia	Waite Agricultural Research Inst.	Glen Osmond
	J.S. Reeves	West. Australia	Department of Agriculture	South Perth
	A.A. Rosielle	West. Australia	Department of Agriculture	South Perth
	N. Roy	West. Australia	Department of Agriculture	South Perth
	M. Ali	West. Australia	University of West. Australia	Nedlands
	W.J.R. Boyd	West. Australia	University of West. Australia	Nedlands
	D.G. Leigh	West. Australia	University of West. Australia	Nedlands
	W.A. Vertigan	Tasmania	Department of Agriculture	Launceston

Table 1: Professional Plant Breeders of Australia (Contd.)

Crop	Breeder	State	Institution or Firm	Location
Biscuit Wheat	J.A. Fisher	New South Wales		
Durum Wheat	P.J. Allen	New South Wales	Department of Agriculture	Tamworth
Winter Wheat	G.M. Bhatt	New South Wales	University of Sydney	Narrabri
Spring Wheat	N.F. Derera	New South Wales	University of Sydney	Narrabri
Barley	R.P. Johnston	Queensland	Department of Primary Industries	Hermitage
	J.A.M. Brown	Victoria	Department of Agriculture	Horsham
	S.E. Ellis	Victoria	Department of Agriculture	Werribee
	S. Lokos	Victoria	Department of Agriculture	Werribee
	D.A. Sparrow	South Australia	Waite Agricultural Research Institute	Glen Osmond
	P.A. Portmann	West. Australia	Department of Agriculture	South Perth
	M. Ali	West. Australia	University of Western Australia	Nedlands
	W.J.R. Boyd	West. Australia	University of Western Australia	Nedlands
	D.G. Leigh	West. Australia	University of Western Australia	Nedlands
	W.A. Vertigan	Tasmania	Department of Agriculture	Launceston
	B. Hollingdale	New South Wales	Department of Agriculture	Wagga Wagga
	E.P. Baker	New South Wales	University of Sydney	Sydney
Oats	D. Rosser	Queensland	Department of Primary Industries	Hermitage
	M. Marwan	New South Wales	Department of Agriculture	Glen Innes
	F. Mengersen	New South Wales	Department of Agriculture	Temora
	G.L. Roberts	New South Wales	Department of Agriculture	Temora
	E.P. Baker	New South Wales	University of Sydney	Sydney
	J.A.M. Brown	Victoria	Department of Agriculture	Horsham
	J.B.Q. Brouwer	Victoria	Department of Agriculture	Werribee
	P. Portmann	West. Australia	Department of Agriculture	South Perth
Rye (including Triticale)	E.M. Matheson	New South Wales	University of New England	Armidale
	J.B.Q. Brouwer	Victoria	Department of Agriculture	Werribee
	J.S. Reeves	West. Australia	Department of Agriculture	South Perth

Table 1: Professional Plant Breeders of Australia (Contd.)

Crop	Breeder	State	Institution or Firm	Location
Sorghum	R.F. Moore	Queensland	Department of Primary Industries	Bildela
	R.G. Henzell	Queensland	Department of Primary Industries	Hermitage
	A.J. Millington	Western Aust.	Division of Land Research	Kununurra
	M. Vincent	New South Wales	DeKalb Shand Seed Co. Pty. Ltd.	Tamworth
	K.S. McWhirter	New South Wales	University of Sydney	Sydney
	P. Thompson	Nth. Territory	Northern Territory Administration	Darwin
	R.W. Downes	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
Linseed	R.P. Johnston	Queensland	Department of Primary Industries	Hermitage
	G.C. Buzza	Victoria	Department of Agriculture	Werribee
	G.M. Mayo	Sth. Australia	University of Adelaide	Adelaide
	J.S. Reeves	West. Australia	Department of Agriculture	South Perth
Maize	P.W. Grogan	Queensland	Department of Primary Industries	Gatton
	I.F. Martin	Queensland	Department of Primary Industries	Kairi
	G.R. Scott	New South Wales	Department of Agriculture	Glen Innes
	J.M. Colless	New South Wales	Department of Agriculture	Grafton
	A.J. Pryor	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
	A. Bourne	New South Wales	DeKalb Shand Seed Co. Pty. Ltd.	Armidale
	K.S. McWhirter	New South Wales	University of Sydney	Sydney
Cotton	V.C. Mungomery	Queensland	Department of Primary Industries	Biloela
	N.E. Challinor	New South Wales	Department of Agriculture	Narrabri
	A. Low	New South Wales	Division of Land Research	Griffith
	N.J. Thomson	New South Wales	Division of Land Research	Narrabrai
	N. Roy	West. Australia	Department of Agriculture	South Perth
Rape Seed	N. Wratten	New South Wales	Department of Agriculture	Wagga Wagga
	G.C. Buzza	Victoria	Department of Agriculture	Werribee
	N. Roy	West. Australia	Department of Agriculture	South Perth
	R.A. Richards	West. Australia	University of Western Australia	Nedlands
	N. Thurling	West. Australia	University of Western Australia	Nedlands
	R.W. Downes	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra

Table 1: Professional Plant Breeders of Australia (Contd.)

Crop	Breeder	State	Institution or Firm	Location
Soya Beans	J.L. Rose	Queensland	Department of Primary Industries	Hermitage
	D.E. Byth	Queensland	University of Queensland	St. Lucia
	I.A. Rose	New South Wales	Department of Agriculture	Narrabri
	K.S. McWhirter	New South Wales	University of Sydney	Sydney
Peas	Y. Aitken	Victoria	University of Melbourne	Melbourne
Lupins	J.S. Gladstones	West. Australia	Department of Agriculture	South Perth
Sunflowers	D.L. George	Queensland	Department of Primary Industries	Hermitage
	J.R. McWilliam	New South Wales	University of New England	Armidale
	R.W. Downes	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
Rice	R.A. Hartley	New South Wales	Department of Agriculture	Yanco
	L.G. Lewin	New South Wales	Department of Agriculture	Yanco
	D.J. McDonald	New South Wales	Department of Agriculture	Yanco
	E.C.B. Langfield	Nth. Territory	Division of Land Research, C.S.I.R.O.	Darwin
Sugar cane	D.M. Hogarth	Queensland	Bureau of Sugar Experimental Station	Brisbane
	N. Berding	Queensland	Bureau of Sugar Experimental Station	Gordonvale
	Y.S. Pollock	Queensland	Bureau of Sugar Experimental Station	Gordonvale
	J.C. Skinner	Queensland	Bureau of Sugar Experimental Station	Gordonvale
	B.T. Roach	Queensland	Colonial Sugar Refining Co.	MacKnade
	P.B. Hutchinson	New South Wales	Colonial Sugar Refining Co.	Rosedale
	G. Tlaskal	New South Wales	Colonial Sugar Refining Co.	Roseville
Tobacco	V.J. Hansen	Queensland	Department of Primary Industries	Northgate
	Gillham	Queensland	Division of Land Research	Mareeba
	H. Wuttke	Queensland	Division of Plant Industry, C.S.I.R.O.	Beerwah
	D.C. Wark	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
	W.R. Scowcroft	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
Millet	M. Vincent	New South Wales	DeKalb Shand Seed Co. Pty. Ltd.	Tamworth

Table 1: Professional Plant Breeders of Australia (Contd.)

Crop	Breeder	State	Institution or Firm	Location
Various crops	J.V. Mullaly	Victoria	Department of Agriculture	Melbourne
Coarse grain	B. Hollingdale	New South Wales	Department of Agriculture	Wagga Wagga
Potatoes	R.W. Bowen	New South Wales	Department of Agriculture	Glen Innes
	M. Gartner	Victoria	Department of Agriculture	Healesville
	D.C. Hosking	West. Australia	Department of Agriculture	South Perth
Tomatoes	P.R. Beal	Queensland	Department of Primary Industries	Delta
	I.A. Bonner	Queensland	Department of Primary Industries	Ormiston
	J. Sumeghy	New South Wales	Department of Agriculture	Richmond
	H. Nirk	Victoria	Department of Agriculture	Burnley
Onions	P.I. Pryne	Victoria	Department of Agriculture	Burnley
Beans (French)	P.T. Farlow	Queensland	Department of Primary Industries	Ormiston
	D.W. Shephard	Queensland	Department of Primary Industries	Ormiston
	J. Sumeghy	New South Wales	Department of Agriculture	Richmond
	P.I. Pryne	Victoria	Department of Agriculture	Burnley
Capsicum	J. Sumeghy	New South Wales	Department of Agriculture	Richmond
Strawberries	I.A. Bonner	Queensland	Department of Primary Industries	Ormiston
Apples	A.M. Hibberd	Queensland	Department of Primary Industries	Applethorpe
	P.W. Winks	Queensland	Department of Primary Industries	Applethorpe
(Pome fruit)	D.H. Maggs	Victoria	Division of Hort. Research, C.S.I.R.O.	Merbein
	D.McE. Alexander	Victoria	Division of Hort. Research, C.S.I.R.O.	Merbein
Peaches	A.M. Hibberd	Queensland	Department of Primary Industries	Applethorpe
	C.W. Winks	Queensland	Department of Primary Industries	Applethorpe

Table 1: Professional Plant Breeders in Australia (Contd.)

Crop	Breeder	State	Institution or Firm	Location
Citrus	K.R. Jorgensen	Queensland	Department of Primary Industries	Maryborough
	D.H. Maggs	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
	D.McE. Alexander	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
Grapes	A.J. Antcliff	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
Avocadoes	D.H. Maggs	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
	D.McE. Alexander	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
Mangoes	D.H. Maggs	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
	D.McE. Alexander	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
Macadama nut	D.H. Maggs	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
	D.McE. Alexander	Victoria	Division of Horticultural Research, C.S.I.R.O.	Merbein
Pawpaw	P.R. Farlow	Queensland	Department of Primary Industries	Ormiston
	M.E. Nicholson	Queensland	Department of Primary Industries	Nambour
Vegetables	D. Blazey	New South Wales	Yates Seeds Ltd.	Castle Hill
Dolichos	I.B. Staples	Queensland	Department of Primary Industries	Mareeba

Table 1: Professional Plant Breeders in Australia (Contd.)

Crop	Breeder	State	Institution or Firm	Location
Lucerne	I.D. Kaehne	Sth. Australia	Department of Agriculture	Northfield
	R.A. Bray	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
	R.J. Clements	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
	H.V. Daday	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
Festuca arundinacea	G.W. Lawton	Sth. Australia	Department of Agriculture	Northfield
Lolium perenne	G.W. Lawton	Sth. Australia	Department of Agriculture	Northfield
	C.A. Lampe	Victoria	LaTrobe University	Bundoora
Medicago spp.	M.J. Mathison	Sth. Australia	Department of Agriculture	Northfield
Trifolium subterraneum	C.M. Francis	West. Australia	Department of Agriculture	South Perth
	J.S. Gladstone	West. Australia	Department of Agriculture	South Perth
	W.J. Collins	West. Australia	University of Western Australia	Nedlands
	N. Thurling	West. Australia	University of Western Australia	Nedlands
Clovers & grasses	J.A. Carpenter	Tasmania	Department of Agriculture	Launceston
	A. Stephens	Tasmania	Department of Agriculture	Launceston
Cenchrus ciliaris	R.A. Bray	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Panicum maximum	R.A. Bray	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Stylozanthes spp.	D.F. Cameron	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Centrosema pubescens	R.J. Clements	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia

Table 1. Professional Plant Breeders in Australia (Contd.)

Crop	Breeder	State	Institution or Firm	Location
Setaria complex	J.B. Hacker	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Digitaria	J.B. Hacker	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Siratro	E.M. Hutton	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Macroptilium atropurpureum	E.M. Hutton	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Leucaena leucocephala	E.M. Hutton	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Vigna vexillata	E.M. Hutton	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Desmodium	N.S. McWhirter	New South Wales	University of Sydney	Sydney
Desmodium intortum	B.C. Imrie	Queensland	Division of Tropical Pastures, C.S.I.R.O.	St. Lucia
Panicum	R.W. Downes	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
Phaseolus	R.W. Downes	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
Phalaris tuberosa	R.N. Oram	A.C.T.	Division of Plant Industry, C.S.I.R.O.	Canberra
Pasture plants	R. Knight	Sth. Australia	University of Adelaide	Glen Osmond
Forage crops	J.R. McWilliam	New South Wales	University of New England	Armidale
Unstated	A.E. Rumsey	New South Wales	New World Seeds Ltd.	Galston

Table 2: Value of Production from Crops in South Australia

Mean Value for 1967-68 - 1971-72 in Dollars

Wheat	72,055,184	Cherries	664,384
Barley	27,475,716	Strawberries	664,269
Grapes	16,896,947	Lettuces	592,853
Hay	10,225,637	Pumpkins & Lettuce	514,903
Oranges	8,525,808	Plums	376,833
Tomatoes	5,554,202	Cereal Rye	294,532
Oats	4,554,202	Brussel Sprouts	287,419
Potatoes	4,456,587	Other Crops	276,926
Apricots	4,048,539	Grass Seed	179,156
Apples	4,024,801	French Beans	159,680
Peaches	2,762,344	Nectarines	149,372
Onions	2,280,879	Turnips	93,057
Nurseries	2,001,869	Parsnips	88,691
Pears	1,701,549	Olives	52,379
Green Fodder	1,593,759	Spinach & Silver Beet	47,595
Lucerne Seed	1,262,984	Figs	40,815
Other Vegetables	1,261,272	Red Beet	38,173
Celery	1,173,144	Linseed	27,303
Citrus other than Oranges	1,144,576	Vegetable Seed	21,748
Cauliflowers	1,121,619	Canary Seed	19,022
Green Peas	1,028,989	Walnuts	18,937
Field Peas	777,413	Raspberries	17,471
Clover Seed	707,643	Broad Beans	14,282
Cabbages	682,123	Quinces	11,217
Carrots	675,578		
Almonds	669,172	Total	$183,296,545

APPENDIX 1

Importation of Foreign Technology

The Mexican Act is not intended to curb or hamper the import of foreign technology. As the statement of reasons attached the the Act makes clear, its purpose is to fit the purchase of technology to the country's requirements and to prevent abuses arising from a domestic enterprise's weak bargaining position, especially vis-avis the big international sellers of technology.

The Act prescribes that the authorities shall not accept any instrument, agreement or contract concerning technology:-

(1) Whose purpose is to transfer a technology already freely available in the country, always provided that the same technology is in question.

(2) In which the price or consideration bears no relation to the technology purchased or constitutes an unreasonable or excessive burden on the national economy.

(3) Which includes the clauses whereby a regular supplier is permitted to intervene, directly or indirectly, in the management of the enterprise purchasing the technology.

(4) Which stipulates an obligation on the purchaser to cede to the supplier of the technology, for consideration or free of charge, any patents, trademarks, innovations or improvements obtained by the purchaser.

(5) Which imposes limitations on research or technological development by the purchaser.

(6) Which imposes an obligation to purchase equipment, tools, replacement or raw materials exclusively from a specified source.

(7) Which prohibits or limits the export of the goods or services produced by the purchaser in a manner contrary to the national interest.

(8) Which prohibits the use of supplementary technologies.

(9) Which stipulates an obligation to sell the goods produced by the purchaser exclusively to the supplier of the technology.

(10) Which obliges the purchaser to employ as permanent staff persons specified by the supplier of the technology.

(11) Which limits the volume of production or imposes prices for the sale, resale or export of the goods produced by the purchaser in the country.

(12) Which obliges the purchaser to conclude contracts with the supplier of the technology for exclusive sales or agency within the national territory.

(13) Which stipulates unduly long periods for the validity of such contracts, since these periods may in no case exceed ten years for which they shall be binding on the purchaser.

(14) Which stipulates a foreign jurisdiction for the hearing or decision of proceedings which may arise from the interpretation or performance of the said instruments, agreements or contracts.

The Act also states that any contract or agreement concerning technology, including contracts or agreements concerning the licensing of patenss and the use of trademarks, which are not entered in the National Register of Transfer of Technology owing to the restrictive clauses listed above, "shall have no force in law and may not therefore be relied on in proceedings before any authority nor may its performance be demanded in the national courts".