

**TECHNICAL BULLETIN  
NO. 246**

**SESAME 2005**  
**A STRATEGIC PLAN FOR THE AUSTRALIAN SESAME  
INDUSTRY  
1995 TO 2005**



# **SESAME 2005**

## **A STRATEGIC PLAN FOR THE AUSTRALIAN SESAME INDUSTRY**

**1995 TO 2005**

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**November 1995**

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## **SUSTAINABLE AGRICULTURE**

### **THE DEPARTMENT OF PRIMARY INDUSTRY AND FISHERIES IS COMMITTED TO THE PRINCIPLES AND PRACTICES OF SUSTAINABLE AGRICULTURE**

#### **Definition:**

Sustainable agriculture is the use of practices and systems which maintain or enhance:

- the economic viability of agricultural production:
- the natural resource base: and
- other ecosystems which are influenced by agricultural activities.

#### **Principles:**

1. Agricultural productivity is sustained or enhanced over the long term.
2. Adverse impacts on the natural resource base of agricultural and associated ecosystems are ameliorated, minimised or avoided.
3. Harmful residues resulting from the use of chemicals for agriculture are minimised.
4. The nett social benefit (in both dollar and non-dollar terms) derived from agriculture is maximised.
5. Agricultural systems are sufficiently flexible to manage risks associated with the vagaries of climate and markets.

## **SUSTAINABLE AGRICULTURE IN THE NORTHERN TERRITORY**

Strategic Plan for the Australian Sesame Industry  
1995 to 2005

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## EXECUTIVE SUMMARY

The First Australian Sesame Workshop was held at Katherine and Darwin from 21 to 23 March 1995. The Workshop was held to enable those involved in the sesame industry to exchange information on research, production, marketing and processing. Invited speakers presented papers on various facets of the Australian sesame industry and identified the major constraints to expansion of the industry. One of the objectives of the Workshop was to develop strategies for a coordinated approach to the expansion of the Australian sesame industry. Following the Workshop it was agreed that while many of the crucial issues facing the industry had been identified it was necessary to collate the many suggestions and develop a strategic plan.

The NT Department of Primary Industry and Fisheries, with funding support from the Grains Research and Development Corporation and the Rural Industries Research and Development Corporation, subsequently commissioned the preparation of a Strategic Plan for the Australian sesame industry for the period 1995 to 2005 based on the suggestions made at the Workshop. The Strategic Plan has been prepared in a corporate format and contains a Vision Statement for the industry plus a listing of Objectives, Strategies and Tasks. The tasks are those identified at the Workshop as crucial for the future expansion of the Australian Sesame Industry. As background to the Strategic Plan details are given of the history of sesame production in Australia, of the national and international markets for sesame, and of the sesame production to date in Australia. Estimates of future production for the period 1995 to 2000 based on a survey of farmers conducted subsequent to the Workshop are also provided.

Priorities for the identified tasks were established by four methods. These were the constraints identified by discussion groups during the Workshop; the priorities nominated by the individual participants at the Workshop; the constraints identified by farmers in the survey of farmers and a scoring by four sesame experts of the research tasks identified at the Workshop.

The Workshop identified 34 tasks which have been subdivided under 6 objectives and 12 strategies. The key tasks identified as crucial to the future expansion of the Australian sesame industry are the development of non-shattering, better adapted cultivars, the establishment of quality standards for unhulled sesame seed and the development of improved methods of weed control. Further work to improve crop desiccation techniques and improve harvester performance was also rated as high priority. While such work may be necessary in the short-term it would not be required if cultivars with good seed retention characteristics can be developed.

It is proposed that action be taken to establish an industry organisation which can effectively represent the interests of all those involved in the sesame industry in Australia. This organisation will need to actively initiate and oversee many of the high priority activities identified at the Workshop. It will also be important for this body to liaise closely with the State Departments of Agriculture or Primary Industries in the potential production areas seeking their cooperation in research and development of the sesame industry.

## 1. INTRODUCTION

This Strategic Plan has been prepared as an outcome of a three-day Workshop held at Katherine and Darwin from 21 to 23 March 1995. The Workshop was held to enable those involved in the sesame industry to exchange information on research, production, marketing and processing. Invited speakers presented papers on all facets of the Australian sesame industry and identified the major constraints to expansion of the industry. At a final session of the Workshop, participants were divided into groups to consider which of the constraints identified by the speakers were perceived as the major constraints impeding the future development of the industry. Following the group discussions, the individual participants were asked to list in priority order what they saw as the five most important constraints.

One of the objectives of the Workshop was to develop strategies for a coordinated approach to the expansion of the Australian sesame industry. Following the Workshop it was agreed that while the Workshop had identified many of the crucial issues facing the industry it was necessary to collate the many suggestions and develop a strategic plan.

The Northern Territory Department of Primary Industry and Fisheries (NTDPIF) subsequently commissioned the preparation of a Strategic Plan for the Australian Sesame Industry for the period 1995 to 2005 based on the suggestions made at the Workshop. The preparation of this Strategic Plan has been undertaken with funding support from the Grains Research and Development Corporation (GRDC) and the Rural Industries Research and Development Corporation (RIRDC).

The Strategic Plan has been prepared in a corporate format and contains a vision statement for the industry plus a listing of objectives, strategies and tasks. The tasks are those identified at the Workshop as crucial for the future expansion of the Australian Sesame Industry.

As a background to the Strategic Plan details are given of the history of sesame production in Australia, of the national and international markets for sesame, of the sesame production to date in Australia and estimates of future production for the period 1995 to 2005.



## 2. HISTORY OF SESAME PRODUCTION IN AUSTRALIA

The introduction of sesame (*Sesamum indicum*) to northern Australia probably coincided with the arrival of Chinese immigrants from Singapore and Hong Kong in the 1870s following the discovery of gold at Yam Creek and Pine Creek in the Northern Territory (NT). However, the rapid depletion of the alluvial gold deposits resulted in some Chinese immigrants establishing local market gardens. Sesame introduced by these Chinese gardeners quickly naturalised in the surrounding areas, and today three black-seeded landraces of sesame are known to exist between Darwin and Larrimah, some 500 kilometres south of Darwin.

The first recorded introduction of sesame into the NT was made in the mid 1880s by Maurice Holtze, curator of the Government Gardens at Port Darwin. His report on sesame, one of 519 plants tested, was that its performance was 'fully successful'. There were no further records of sesame after the relocation of the Government Gardens to Howard Springs in 1888.

In 1946 CSIRO took control of a wartime Army Farm located on the Katherine River at Katherine in the NT. This became the Katherine Research Station (KRS) and part of its initial brief was to examine alternative cash crops for a peanut and sorghum farming enterprise. Sesame was one of the early crops tested, and during the 1946-47 wet season a successful crop was harvested from a December 11 sowing on a levee soil adjacent to the Katherine River. Plants grew to a height of 137 cm, matured in early March 1947 and were cut and dried in windrows prior to threshing. A grain yield of 454 kg/ha was achieved, but grain quality was not recorded.

There was no systematic introduction of the crop into Australia prior to the Second World War, but after the war some 100 cultivars were imported by the New South Wales Department of Agriculture and evaluated at Grafton. By 1980 another 100 cultivars had been introduced into Australia by the CSIRO Plant Introduction and Seed Exchange Unit.

Sesame research was conducted in Queensland by the Department of Primary Industries between 1973 and 1980. It was realised that seed shattering was one of the major problems with sesame and two varieties were selected which were shatter resistant and capable of producing economic yields. Research on these two varieties examined sowing dates, plant population, inter-row spacing, weed control with herbicides and harvesting methods. By 1981 a production package had been developed and a development program was commenced in the 1981-82 summer with seven crops being sown on farm properties. Unfortunately, five of the seven crops were washed out by heavy rains but the remaining two crops matured satisfactorily producing yields of 1.0 and 0.75 t/ha. The sesame project was then discontinued because of the non-availability of dehulling equipment in Australia. However, it was resumed in 1985 when an importing company was found which had suitable dehulling equipment. Seed was distributed to 16 growers, five on the Darling Down, five in the West Moreton Valleys and six in the South Burnett. Only eight of the sixteen crops survived to maturity giving yields ranging from about 0.3 to 1.3 t/ha. As a result of the poor performance of these trial crops the DPI subsequently terminated the sesame program.

The first successful commercial production of sesame in Australia followed a study conducted in the 1980s in the Top End region of the NT. A three year study was commenced in the 1982-83 wet season to evaluate 14 crops on Tippera clay loam soils across three farming

environments in the NT. These three trials were conducted at Douglas Daly (mean annual rainfall 1200 mm), Katherine (900 mm) and Daly Waters (600 mm). These studies identified sesame as a high value, well adapted crop with excellent domestic and export market opportunities.

The first commercial sesame crop was sown in the 1984-85 wet season by two former members of the NTDPIF who were share farming in the Douglas Daly district. One had been directly involved in the alternative crops research program and recognised that sesame was both well adapted to the region and potentially a very profitable crop. Ten hectares of the Burmese cultivar 'Hnan Dun' produced 7.5 tonnes of grain. In the following years 'Hnan Dun' was abandoned in favour of a Mexican cultivar 'Yori 77' which was more suited to the higher rainfall areas north of Katherine, and the Mexican cultivar 'Pachequino' which was better adapted to the drier areas south of Katherine.

The area sown to sesame steadily increased between 1984-85 and 1988-89 with 1052 ha being sown and 291 tonnes of grain harvested in the 1988-89 season. At that time, sesame accounted for 13.2% of the total cropping area in the NT. The most successful sesame crop was grown in 1987-88 when a one hectare area of cultivar 'Yori 77' produced a machine harvested yield of 1.2 t/ha.

Production after 1989-90 declined due to a series of poor seasons (poor rainfall distribution), poor production practices and increased competition for land as a result of the rapid expansion of the live cattle export trade. The expansion of live cattle markets has led to a strong demand for improved pastures for the agistment or production of cattle. Pasture and cattle production are both seen as simpler operations involving less risk than sesame production.

Following the early promising results in the NT an experimental program was undertaken at the Frank Wise Institute for Tropical Agricultural Research in the Ord River Irrigation Area between 1982 and 1986. In this program several promising varieties were selected and a comprehensive production system was developed. Experimental yields of up to 1.8 t/ha were obtained but despite these high yields local farmers were not prepared to grow the crop. However, one grower at Derby commenced commercial production in 1994 sowing 130 ha for a harvested yield of 48 tonnes.

In the early 1990s commercial sowings of sesame were made in southern and central Queensland under contracts with Sesame Australia. Sesame Australia is a joint venture between Huile Trading Company, a processor of sesame in Melbourne and Selected Seeds Pty Ltd, a Queensland agricultural seed company. The first crops in southern Queensland were grown during the 1990-91 season when 18 ha were sown to produce 7.4 tonnes at an average yield of 0.41 t/ha. Since then drought has severely affected efforts to establish sesame in the region. However, despite the drought a total of 296 ha was sown during the four years to 1993-94 and produced 128 tonnes of grain, giving an average yield of 0.43 t/ha.

In central Queensland the effects of the drought have been even more severe. In the five years to 1994-95 a total of 551 ha was sown but only 128 ha were harvested. The total production was 68 tonnes. The average irrigated yield was 0.79 t/ha while the average dryland yield was only 0.42 t/ha.

In NSW small areas were sown in 1993-94 in the Griffith and Hay areas under contract to Sesame Australia but results were disappointing and no further commercial sowings have been made. A commercial company, Burbank Technology of Tuggerah NSW, is currently testing a range of sesame cultivars and hopes to establish commercial production in NSW with the crop being exported to Japan.

### 3. PAST AND ESTIMATED FUTURE COMMERCIAL SESAME PRODUCTION

This chapter gives details of past production of sesame and estimates of potential future production. The latter were obtained by conducting a survey of farmers who had grown sesame in the past or had indicated an interest in growing the crop.

#### 3.1 Historical production

Australian sesame seed production to date has been restricted to the NT, WA and Qld. As indicated in Chapter 2 the first commercial sesame crop was sown in the 1984-85 wet season in the Douglas Daly district of the NT. The crop was sown by two ex-NTDPIF staff, one of whom had been directly involved in the NT crop research program which had identified sesame as being well adapted to the region and potentially a very profitable crop. Ten hectares of the Burmese cultivar 'Hnan Dun' produced 7.5 tonnes of grain. Details of the NT production since 1985-86 are given in Table 1.

**Table 1. Details of NT sesame production between 1985-86 and 1993-94.**

Season	Area sown to sesame (ha)	Production (tonnes)	Mean Yield (tonnes/ ha)
1985-86	145	131	0.90
1986-87	520	97	0.19
1987-88	745	275	0.37
1988-89	1052	291	0.28
1989-90	585	66	0.11
1990-91	420	90	0.21
1991-92	198	58	0.29
1992-93	130	49	0.37
1993-94	120	26	0.22

In the NT all crops have been grown privately and marketed through the NT Marketing Board which has cleaned the seed and arranged sales of the grain. The Board paid growers a first advance after delivery of the crop to its grain depots and, following final sale of the crop, deducted the costs of cleaning and handling and paid the balance to growers. The seed grown in the NT has all been sold to two buyers, Huile Trading Company in Melbourne and Proteco Pty Ltd of Kingaroy, Qld.

The steady decline in production in the NT since 1989-90 is the result of growers moving away from growing sesame to the growing of pastures for the agistment or production of cattle for the live cattle export trade to Asian markets.

In Queensland, production has been centred in southern and central Queensland. Details of production are given in Tables 2 and 3. All crops in southern and central Queensland have been grown under contracts to Sesame Australia with farm-gate prices ranging from \$800 to \$920/ t.

The main limitations to production throughout all production areas have been a reliance on introduced varieties not adapted to mechanised broadacre farming, farmer inexperience in both production and harvesting methods, and severe drought, particularly in Queensland.

**Table 2. Sesame production in southern Queensland 1991 to 1994.**

Year	Area sown (ha)	Production (tonnes)	Average yield (t/ha)
1991	18	7.4	0.41
1992	38	41.2	1.08
1993	55	16.5	0.30
1994	185	63.0	0.34
<b>Total 1991-1994</b>	<b>296</b>	<b>128</b>	<b>0.43*</b>

\* Weighted average yield for the 4 seasons 1991 to 1994

**Table 3. Sesame production in central Queensland 1991 to 1994.**

Year	Area sown (ha)	Area harvested (ha)	Production (tonnes)	Average yield (t/ ha)
1991	281(37)	30 (37)	20 (25)	0.66 (0.68)
1992	43 (18)	43 (18)	11 (12)	0.28 (0.64)
1993	152	0	0	0
1994	20	0	0	0
<b>Total 1991 to 1994</b>	<b>496 (55)</b>	<b>73 (55)</b>	<b>31 (37)</b>	<b>0.42 (0.67)</b>

Note: Figures in normal type are for dryland crops; bolded figures in brackets are for irrigated crops. The mean yields have been calculated only for the harvested areas; mean yields would be much lower if areas that were sown but not harvested were included.

### 3.2 Estimates of future production 1996 to 2000

In order to obtain information on potential future production a survey was conducted of farmers who had grown sesame in the past or had indicated an interest in growing the crop. Farmers were asked to indicate the areas that they would expect to sow to sesame at a range of farmgate prices ranging from \$600 to \$1400 per tonne using current technology and cultivars. They were also asked for the same information but assuming that current production constraints had been resolved. In all, replies were received from 25 farmers, 10 from the NT, 4 from southern Qld, 5

from central Qld, 1 from northern WA and 5 from NSW. Summaries of the collated results of the survey are summarised in Tables 4 and 5.

**Table 4. Estimates of total areas (hectares) for all potential production areas in Australia that would be sown to sesame for the period 1995 to 2000 for a range of grain prices and using current technology and cultivars.**

Price \$/t	Year				
	1995-96	1996-97	1997-98	1998-99	1999-2000
\$600	28	Nil	Nil	Nil	Nil
\$800	64	100	100	100	100
\$1000	362	370	350	350	350
\$1200	674	659	690	815	1020
\$1400	760	758	885	1010	1195

**Table 5. Estimates of total areas (hectares) for all potential production areas in Australia that would be sown to sesame for the period 1995 to 2000 for a range of grain prices and assuming that that the major perceived constraints had been resolved.**

Price \$/t	Year				
	1995-96	1996-97	1997-98	1998-99	1999-2000
\$600	128	200	200	200	200
\$800	420	370	390	410	450
\$1000	1160	1080	1100	1120	1160
\$1200	1575	1355	1640	2130	2300
\$1400	1785	1510	1810	2340	2440

An examination of the survey data indicates three significant points.

1. Given existing technology the industry may not become very large unless grain prices are over \$1000/ tonne.
2. There would be a significant supply response if the existing constraints could be removed. The data suggests that this would lead to a doubling or trebling of the estimated areas.
3. The survey data cannot be taken to indicate the areas that might be sown to sesame in the future. The total area estimates from the survey are constrained by the limited number of farmers surveyed and the individual farmers surveyed are, in turn, constrained by factors particular to their farm, farming system, financial position or attitudes. The survey was largely restricted to farmers who had previously grown sesame or had indicated some interest in growing sesame. If the Australian sesame industry is to expand it will require the entry of new farmers and they will probably only become interested if most of the current serious constraints identified at the Workshop have been resolved.

Details of the major constraints identified by farmers in the various production areas are given in Section 3.3.

#### **4. NATIONAL AND INTERNATIONAL MARKETS FOR SESAME**

Australia imports between 5 000 and 10 000 tonnes of sesame seed annually, with China, Mexico and India being the main suppliers. There is almost no export of sesame seed from Australia; in 1993-94, 15 tonnes were exported but half of this comprised re-exports.

In 1993, the world trade in sesame seed was 486 000 tonnes with Japan the largest importer taking 115 000 tonnes, 24% of world imports. The major suppliers to the Japanese market are China, Burma and Vietnam. The second largest importer was the USA with 8% of world imports (37 000 tonnes). Major suppliers to the USA are Guatemala and Mexico. Other major importers in 1993 included western Europe (45 000 tonnes) and China (13 000 tonnes). It is forecast that imports of sesame seed will grow worldwide at between 6% and 8% per annum until the year 2012. It is also forecast that world production of sesame seed will increase at the same rate with India dominating supply. There appears to be good potential to develop markets for Australian sesame seed, both domestically and overseas. To enter the export market, the industry will need to demonstrate a high degree of commitment and commence developing unique product characteristics (such as quality or innovative marketing methods) to give Australian sesame seed a competitive edge over the established suppliers.

## 5. STRATEGIC PLAN 1995 TO 2005

### 5.1 Introduction

The Strategic Plan for the Australian Sesame Industry detailed in this chapter has been prepared largely from the suggestions and recommendations made by speakers at the First Australian Sesame Workshop, the suggestions made by the Discussion Groups at the Workshop and a priority listing prepared by the individual participants at the Workshop. This information was supplemented in several ways. The first was by comments obtained from a survey of sesame growers. The second was by establishing a priority order for the research tasks by having four individuals with extensive experience with sesame score a series of five criteria which were selected as being important determinants of the likely value of the task in helping the future expansion of the Australian Sesame Industry.

From the suggestions made at the Workshop it was possible to specify a vision, objectives, strategies and tasks for the sesame industry strategic plan and these are detailed in Sections 5.2 to 5.4.

In Section 5.5 summaries are given of the priorities for the various tasks arising from the Workshop, the survey of farmers and the scores given by the four sesame researchers.

Suggestions and recommendations for future action to implement the Strategic Plan are given in Section 6.

### 5.2 Industry Vision

The vision for the Australian Sesame Industry is seen as being:

**A commercially profitable and internationally competitive industry that is sustainable in respect to natural resource use and recognised in world markets as a reliable supplier of premium quality sesame seed and sesame products.**

### 5.3 Industry Objectives

The above vision will be attained by pursuing the following six objectives:

**Objective 1:** To develop a coordinated Australian sesame industry in which all parties involved in the production, marketing and processing of sesame receive fair and adequate returns.

**Objective 2:** To develop a cohesive industry structure which meets the needs of all parties involved in the industry, and which ensures maximum effective communication and cooperation between all parties, consistent with the interests of each group.



- Objective 3:** To develop technology and management practices in production and processing operations which ensure the efficiency and international competitiveness of the Australian sesame industry.
- Objective 4:** To develop a diverse range of sesame products meeting the needs of specific markets in order to develop a stable and profitable industry.
- Objective 5:** To establish a competitive and efficient sesame marketing system that is responsive to the needs of producers, processors, marketeers and consumers and which establishes for Australian sesame and sesame products a national and international reputation of premium quality.
- Objective 6:** To ensure the availability of adequate funding to cover the costs of research and development, promotion, communication and general industry representation.

#### **5.4 Strategies and tasks to achieve industry objectives**

The following are the proposed strategies and tasks to meet the listed objectives:

- Objective 1:** To develop a coordinated Australian sesame industry in which all parties involved in the production, marketing and processing of sesame receive fair and adequate returns.

**Strategy 1:** Establish an appropriate Australian Sesame Industry Association.

**Task 1** Establish an incorporated Australian Sesame Industry Association with membership restricted to individuals actively involved in the Australian sesame industry and with a Board of Management containing representatives from all sectors of the sesame industry in Australia.

**Strategy 2:** Make representations on behalf of the sesame industry.

**Task 2** Seek representation on the Australian Oilseeds Federation to ensure that the sesame industry is recognised as part of the wider Australian oilseeds industry and to provide access to the facilities and information associated with that organisation.

**Task 3** Negotiate with the NT Government seeking modification of their stockfeed price support measures to ensure they do not result in market distortion and disadvantage other crops, such as sesame.

**Task 4** Negotiate with the NT Government seeking the release of more land for crop production in the NT.

**Strategy 3:** Develop initiatives aimed at developing the Australian sesame industry.

**Task 5** Develop initiatives aimed at ensuring price stability in the sesame industry. The initiatives may include the negotiation each year of benchmark prices for the different grades of sesame seed, and the establishment of forward contracts between growers and buyers with provision for advance payments.

**Task 6** Establish a levy on producers, processors and marketeers to provide funding to facilitate execution of the strategies (see also Task 34).

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**Objective 2:** To develop a cohesive industry structure which meets the needs of all parties involved in the industry, and which ensures maximum effective communication and cooperation between all parties consistent with the interests of each group.

**Strategy 4:** Establish procedures which ensure effective communication and cooperation between all sectors of the industry and provide up-to-date information on all facets of the industry.

**Task 7** Assess and develop mechanisms to ensure effective communication between all sectors of the industry. Establish a network of farmers, researchers and extension staff and provide them with timely and relevant information on markets and standards. The possibilities include a newsletter, internet and the conduct of an annual or biennial meeting or workshop.

**Task 8** Identify and develop ways to obtain improved access to international information on sesame.

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**Objective 3:** To develop technology and management practices in production and processing operations which ensure the efficiency and international competitiveness and efficiency of the Australian sesame industry.

**Strategy 5:** Utilise existing knowledge to inform growers of best practices for sesame growing and harvesting in the potential production areas of the Northern Territory, central Queensland, southern Queensland, northern NSW and southern NSW.

**Task 9** Assemble technical information on sesame production and processing in a national data base.

**Task 10** Prepare a manual for distribution to growers, consultants and extension staff containing packages of 'best bet' cultural practices for the different potential production areas. The packages should cover ley farming, zero-till, rotations, and pest and nutrient management, and utilise the technical data base developed under Task 9.

**Task 11** Establish procedures to produce adequate supplies of high quality pure seed of selected adapted sesame cultivars for sowing.

**Task 12** Establish demonstration areas in potential production areas and seek to encourage new growers to sow small trial areas to gain experience and encourage them to grow larger areas.

**Strategy 6:** Establish a research and development program which addresses industry constraints and exploits any existing opportunities.

**Task 13** Establish a National Sesame Crop Improvement Program with regional testing for local production. This program should make best use of State and Commonwealth (ie CSIRO) facilities. The major objectives of the crop improvement should be the development of improved sesame cultivars having the following characteristics:

1. reduced photoperiod sensitivity
2. reduced susceptibility to pests and diseases
3. a range of maturities to increase areas of adaptation
4. improved seed retention
5. lower base temperatures to permit earlier sowing in higher latitudes
6. adaptation to machine harvesting
7. improved and uniform grain quality
8. increased determinancy.

**Task 14** Develop a process-based sesame growth model that can be used to predict growth and grain yield for a range of cultivars and environments.

**Task 15** Develop integrated systems of sesame production and propose 'best-bet' systems for the different regions.

**Task 16** Further development of crop desiccation techniques to reduce seed loss.

**Task 17** Develop improved methods of weed control for sesame, with a particular focus on broadleaf weeds.

**Task 18** Define nutrient requirements of sesame for different cultivars, soils and environments.

**Task 19** Define optimum times of sowing and optimum plant populations.

**Task 20** Refine zero-till techniques for sesame.

**Task 21** Evaluate the role of sesame in a ley farming system.

**Task 22** Develop cultural practices or improved seed characteristics to improve crop establishment.

**Task 23** Develop farming systems which integrate sesame into crop rotations, particularly rotations involving legumes.

**Task 24** Develop a package of harvesting practices to minimise seed losses, including adaptations and modifications to standard harvesting equipment.

**Task 25** Develop the technology to convert combine planters so that they can be used to sow sesame under a zero-till system.

**Task 26** Maintain quarantine activities for pests and diseases of sesame and continuously monitor trials and commercial sowings of sesame for disease incidence.

**Task 27** Develop a comprehensive Integrated Pest Management (IPM) system for sesame with detailed studies on the biology of sesame leaf webber (*Antigastra catalaunalis*) to identify appropriate methods for its control.

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**Objective 4:** To develop a diverse range of sesame products meeting the needs of specific markets in order to develop a stable and profitable industry.

**Strategy 7:** Inform industry of the availability and quality of Australian sesame and seek to foster the local processing of Australian sesame.

**Task 28** Develop strategies to foster domestic value-adding enterprises that could be implemented once production rises.

**Strategy 8:** Undertake research and development into the end-uses of sesame, both to provide quantitative criteria that could be used as selection and testing criteria in crop improvement programs and to improve the quality of end-products.

**Task 29** Develop improved end-product quality to meet market requirements.

**Task 30** Examine the feasibility of growing organic sesame seed.

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**Objective 5:** To establish a competitive and efficient sesame marketing system that is responsive to the needs of producers, processors, marketeers and consumers and which establishes for Australian sesame and sesame products a national and international reputation of premium quality.

**Strategy 9:** Through the Australian Sesame Industry Association establish a marketing group which can liaise with growers, buyers, processors and consumers to ensure that there is an orderly and stable development of the industry, that standards are established, publicised and adopted, and that a favourable reputation is developed for Australian sesame.

**Task 31** Develop, publicise and seek general industry acceptance of a system of Australian quality standards for unhulled sesame seed for both confectionery and industrial use. The standards should be developed in collaboration with all sectors of the industry and be consistent with international marketing standards for quality.

**Strategy 10:** Through the Australian Sesame Industry Association seek to arrange for the introduction of price stabilisation mechanisms within the Australian Sesame Industry.

**Task 32** Encourage the development and introduction of forward contracts and crop advances.

**Strategy 11:** Foster the establishment and implementation of a quality assurance system for unhulled sesame seed covering both confectionery and industrial use that is acceptable to all sectors of the industry.

**Task 33** Develop an appropriate quality assurance scheme and seek its implementation by sesame marketing groups.

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**Objective 6:** To ensure the availability of adequate funding to cover the costs of research and development, promotion, communication and general industry representation.

**Strategy 12:** Establish a sesame industry fund which can be used to finance research and development activities, promotion, communication and general industry representation.

**Task 34** Through the Australian Sesame Industry Association and the Australian Oilseeds Federation arrange for sesame to be included as a mandated Grains Research and Development Corporation crop and establish a voluntary levy involving all sectors of the sesame industry.

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## 5.5 Priorities for strategies and tasks

Four methods were used to establish the priorities for the 34 tasks identified at the Workshop. These were:

- the major constraints identified by five discussion groups at the Workshop

- the priorities nominated by the individual participants at the Workshop
- the major constraints identified from the survey of farmers
- a ranking of the tasks identified by the Workshop in priority order using a scoring technique to rate five criteria considered to be important determinants of the future development of the Australian sesame industry

Full details of the method used in establishing the priorities by these four methods and the results obtained are discussed in the Consultancy Report (October 1995). It is not possible to directly compare the four data sets detailed in Section 3.1 to 3.4 as they were obtained in very different ways. For example the data sets in sections 3.1 and 3.2 specifically refer primarily to the 34 tasks listed in Section 5.4. In contrast, the data set in Section 3.3 refers only to the research tasks (ie Tasks 13 to 27) and the list of constraints obtained during the farmers' survey and detailed in Section 3.4 had no limitations.

The following is a summary of the recommended priorities identified by the four different methods.

### 5.5.1 Priorities of tasks identified at the Workshop

In Table 6 the tasks are ranked in priority order as indicated from the data from the Discussion groups, and the Individual participants at the Workshop.

**Table 6. Summary of priority order for tasks as identified by the Workshop discussion groups and the individual participants.**

Ranking	Discussion Groups	Individual Participants
1	13(4), 13(7), 13(1), 13(2), 13(3)	13(4), 13(3), 13(2), 13(1), 13 (7), 13(8)
2	16	31
3	31	17
4	5, 7, 15, 17	24
5	2, 12, 14, 19, 22, 23, 24, 27, 32	9

While these data show some variation they do indicate that the following were seen as being the highest priority tasks:

**Task 13** Develop improved sesame cultivars , particularly the development of cultivars with reduced response to photoperiod, reduced susceptibility to insect pests and disease, a range of maturities, improved seed retention and improved and uniform grain quality.

**Task 31** Develop quality standards for unhulled sesame seed for both confectionery and industrial use.

**Task 16** Develop improved crop desiccation techniques to reduce seed loss.

**Task 17** Develop improved methods of weed control for sesame, with a particular focus on broadleaf weeds.

**Task 5** Develop initiatives aimed at ensuring price stability in the sesame industry.

**Task 7** Assess and develop mechanisms to ensure effective communication between all sectors of the industry and establish a network of farmers, researchers and extension staff and provide them with timely and relevant information on markets and standards.

**Task 15** Develop integrated systems of sesame production and propose 'best-bet' systems for different regions.

**Task 24** Develop a package of harvesting practices to minimise seed losses.

### **5.5.2 Priorities of tasks identified from the survey of farmers.**

The major constraints to increased sesame production as identified by the twenty five respondents in the survey are summarised in Table 7.

Overall, the collated data from all the production areas indicates that growers saw the major constraints to production as:

- pre-harvest and harvest seed losses
- low yields and low returns per hectare
- problems of weed control, especially of broadleaf weeds
- uneven flowering and uneven maturity
- lack of adapted cultivars
- need to modify harvester
- lack of feeding value of the stubble

**Table 7. Summary of the major factors stated by farmers as influencing their future decision on the area that they will sow to sesame.**

Production area	Number of farmers surveyed	Major factors influencing area sown
NT	10	<ul style="list-style-type: none"> <li>• pre-harvest seed losses</li> <li>• harvest losses</li> <li>• lack of feeding value of the stubble</li> <li>• lack of suitable harvester</li> <li>• failure to give returns comparable with either irrigated or dryland maize, sorghum or Centrosema</li> <li>• lack of suitable cleared land</li> <li>• lack of finance</li> <li>• need to clear land</li> <li>• no technology to undersow crop with a legume</li> </ul>
Northern WA	1	<ul style="list-style-type: none"> <li>• limited land available within a legume rotation</li> <li>• harvesting limitations (harvesting window and header size)</li> <li>• problems of weed control</li> </ul>
Central Qld	5	<ul style="list-style-type: none"> <li>• price/ t and low return/ ha</li> <li>• harvesting problems</li> <li>• establishment problems</li> <li>• available cultivars low yielding and unsuited for district</li> <li>• planting depth</li> <li>• high seed loss at and before harvest</li> <li>• lack of information on weed and insect control</li> <li>• Indeterminate flowering</li> </ul>
Southern Qld	4	<ul style="list-style-type: none"> <li>• pre-harvest shattering</li> <li>• shattering at harvest</li> <li>• limited planting window</li> <li>• waterlogging</li> <li>• limited area of suitable soil</li> <li>• uneven flowering</li> </ul>
NSW	5	<ul style="list-style-type: none"> <li>• lack of suitable cultivars</li> <li>• low price</li> <li>• harvesting and shattering problems</li> <li>• uneven flowering and maturity</li> <li>• concerns about end-user monopoly</li> <li>• establishment problems</li> <li>• problems of broadleaf weed control</li> <li>• need to modify harvester</li> </ul>



### 5.5.3 Summary of priority ratings for research tasks as determined by the scoring technique

In the absence of detailed data which would permit a benefit-cost analysis in quantitative economic terms a scoring system was developed which involved developing an 'importance rating' (IR) for the selected tasks listed in Section 5.4. The IR was calculated for each task by a subjective rating from 1 to 5 for the five criteria listed below. These five criteria were considered to collectively reflect the importance of that task in the future development of the Australian sesame industry.

- potential impact on productivity and economic benefits (low = 1, medium = 3, very high = 5)
- potential to reduce risk (low potential = 1, medium potential = 3, high potential = 5)
- likelihood and time of achieving the desired objective (low = 1, medium = 3, very high = 5)
- likely cost of achieving the benefits ( low = 5, medium = 3, very high = 1)
- likely level of adoption of the technology arising from research (low = 1, medium = 3, 5 = high)

This assessment was undertaken only for Tasks 13 to 27. These tasks are those involving research and it was considered that the scoring system was best suited to such items. In the case of the other tasks, which deal with organisational matters relating to industry development, it was considered that it would be very difficult to assess these in terms of the five criteria listed above.

The scoring was undertaken by two members of the working committee (Mr Malcolm Bennett and Dr Bruce Imrie), Mr Robin Barrett, a grower from Derby in WA and Mr Phil Hausler, Extension Officer, NTDPIF at Katherine, NT. The rankings for the top nine tasks based on the totals of the four scores are shown in Table 8.

**Table 8. Rankings and total scores for the top nine tasks as scored by a group of four sesame experts.**

Ranking order	Based on total of scores
1	24
2	19
3	13 (3), 13 (4)
4	26
5	17
6	13 (6)
7	18, 20

The four respondents, therefore, saw the most important tasks as:

- Task 24** developing a package of harvesting practices to minimise seed losses. The package to cover adaptations and modification of standard harvesting equipment.
- Task 19** defining optimum times of sowing and optimum plant populations.
- Task 13(3)** developing cultivars with a range of maturities to increase areas of adaptation.
- Task 13(4)** developing cultivars with improved seed retention.
- Task 26** maintaining quarantine activities for pests and diseases of sesame and continued monitoring of trials and commercial sowings of sesame for disease incidence.
- Task 17** developing improved methods of weed control for sesame, with a particular focus on broadleaf weeds.
- Task 13(6)** developing cultivars adapted to machine harvesting.
- Task 18** defining nutrient requirements of sesame for different cultivars, soils and environments.
- Task 20** refining zero-till techniques for sesame.

## 5.6 Discussion

The priorities for the research and development activities which were identified at the Workshop as the major immediate constraints to the development of the Australian sesame industry are detailed in Section 5.5 above. While the development of such industry components as marketing, processing and communication are clearly important for future development it is clear from the priorities determined by the Workshop discussion groups, the ratings given by the individual Workshop participants and the results of the survey of farmers that the initial emphasis needs to be in resolving the technological problems associated with field production. The main thrust in developing the present plan has, therefore, been to set priorities for an effective research and development program and to develop an industry infrastructure to facilitate, coordinate and oversee this program.

## 6. SUGGESTIONS AND RECOMMENDATIONS FOR FUTURE ACTION TO IMPLEMENT THE STRATEGIC PLAN

The Australian Sesame Industry is currently faced with several serious problems.

The first is the lack of a sesame production package which is reliable, profitable and attractive to farmers. Current cultivars are all subject to capsule splitting at maturity leading to serious grain losses both prior to and during harvesting. There are also a number of cultural problems including establishment, weed control and harvesting.

The second is the lack of a representative body which can act to foster the development of the industry or take direct action to resolve the many problems that were identified at the First Australian Sesame Workshop.

The third problem arises from the wide geographic spread of production with current production located in northern Western Australia, the NT and Queensland, and with the possibility of future sowings in NSW. This geographical spread ranging in latitude from about 12 to 34°S covers tropical, sub-tropical and temperate areas and necessitates a suite of cultivars with differing responses to photoperiod and temperature. It also requires the development of different cropping systems to cover the wide range of environments and farming systems under which the crops are being grown.

With the current limited level of production it is difficult to justify the funding of research aimed at developing cultivars and cropping systems suitable for all potential production areas. Unfortunately, there is no single area which clearly offers the greatest promise for production. In the NT the number of farmers and the area of developed arable land are limited. In addition, most of the current farmers consider that other cropping options are more profitable at present, less complex and involve less risk than sesame. In Queensland, farmer experience with sesame in the trials sown in southern and SE Queensland during the 1980s and the more recent sowings in central and southern Queensland has not been encouraging and farmers have indicated a reluctance to grow the crop even at prices substantially higher than those currently being offered. The results of the survey also indicate that farmers in NSW do not consider the prospects for sesame as particularly promising.

While the priority order for the tasks necessary to resolve the major constraints to sesame production vary between the different groups used to establish the priorities there is general agreement as to the key constraints. The major constraint is perceived as inadequate cultivars with proneness to shattering as the most serious deficiency. However, current cultivars are also seen as low yielding, too responsive to photoperiod, too susceptible to insect pests and disease and requiring improvements in grain quality.

Other tasks which were seen as warranting a high priority were the establishment of quality standards for unhulled sesame seed and the development of improved methods of weed control, particularly of broadleaf weeds. Several tasks aimed at overcoming the shattering problems associated with current cultivars were also given a high priority, particularly by farmers and researchers. These included further development of crop desiccation techniques and engineering work to improve harvester performance. This work is likely to be particularly important in the short-term pending the development of cultivars with good seed retention characteristics.

While not identified as a key issue at the Workshop it is clear that the industry has been severely hampered by the lack of an industry body which can effectively represent the interests of all those involved in the industry in Australia. It is therefore proposed that early action be taken to establish an appropriate industry organisation. This organisation will need to actively initiate and oversee many of the high priority activities identified in this report. These include the development and industry acceptance of quality standards, liaison with the Australian Oilseeds Federation and the establishment of a National Sesame Crop Improvement Program. It will also be important for this body to liaise closely with the State Departments of Agriculture or Primary Industries in the potential production areas seeking their cooperation in research and development of the sesame industry.

It is suggested that the current Working Party of Mr Malcolm Bennett, Dr Bruce Imrie and Mr Lawrie Raymond be given the task of overseeing the establishment of an appropriate Sesame Industry body.

It is also proposed that early action be taken to implement a National Sesame Improvement Program. As suggested at the Workshop, it is proposed that the program be based at the CSIRO Division of Tropical Crops and Pastures, Brisbane and conducted in collaboration with the NT Department of Primary Industry and Fisheries and the Queensland Department of Primary Industries.

The priorities identified by the Workshop delegates (Section 5.5.1), by those farmers who participated in the survey (Section 5.5.2) and by the members of the Working Party (Section 5.5.3) provide a valuable guide for planning a program for future research. However, the decision on the actual topics to include in the research and development program will need to be decided in the light of available funding and, in some cases, on more detailed benefit-cost analyses.