



Know-how for Horticulture™

**Developing strategies
to stimulate local
consumption, export
and import
replacement of globe
artichokes**

Fouad H. Gaoubran *et al*
Natural resources and
Environment
Horticulture Australia
Limited

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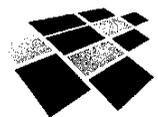
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FINAL REPORT

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Project Title: The Globe Artichoke: A strategy to stimulate local consumption, export and import replacement.

Project No.: VG99030

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Purpose of the report: Reporting the findings of an investigation into the status of the globe artichoke industry in Australia and propose a value-adding strategy aimed at increasing consumption and raising the profile of globe artichoke.

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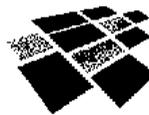
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1. Media Summary

Statistics indicate that the Australian production and consumption of globe artichokes have not kept pace with the increase that has taken place with other vegetable crops. This static state of affairs could be attributed to a number of reasons. These include unfamiliarity of the majority of consumers with this vegetable, its use and/or difficulty in its preparation, competition from processed products and lack of promotion. This is despite the crop's culinary versatility, excellent nutritional value and potential export prospects.

Presently, the globe artichoke industry is small. However, it has the potential to expand considerably over the next few years. Australia is currently a net importer of artichoke products to meet the needs of consumers and a small local processing industry that relies on imported canned artichokes as primary material for its anti-pasto and related products. These products are marketed locally and/or exported at a much higher price than the imported primary material.

The aim of this project was to:

- Identify barriers obstructing the local expansion and export market opportunities for globe artichokes
- Develop a protocol for a frozen artichoke product
- Assess the consumers acceptance of such a product
- Document to growers the benefits of a processed product as a viable and complementary alternative to their present focus on a limited fresh market.

This project has shown that value adding (eg. freezing artichoke hearts) is technically feasible for globe artichoke and that its commercial acceptance would considerably boost the local consumption in both the retail markets and food service sector. The project has also demonstrated that a cooked and frozen artichoke product that is ready to heat and eat would also be highly acceptable to the markets locally and overseas. Given the health benefits and nutritional value of artichokes, the export opportunities will be also enhanced in the health conscious and expanding Asian markets.

Further work is required to bring this concept to realisation and adoption by the processing industry. Moreover, in order to achieve this aim the artichoke industry will need to re-assess its existing local fresh market orientation and re-adjust itself to meet the expected requirements of a local processing industry.

2. Technical Summary

The volume and variety of vegetables offered to Australian consumers have increased dramatically over the last 20 years. However, the production of globe artichoke has remained to a large extent, almost static at between 500 and 1500 tonnes for decades. This situation reflects limited consumption, which can be attributed to unfamiliarity and/or difficulty in the preparation and use of artichokes. This is despite the crop's culinary versatility, excellent nutritional value and potential export prospects. As well as pursuing opportunities to increase local consumption, there is also a need to address export and import replacement opportunities.

Australia is currently a net importer of processed artichoke products to meet consumers' needs and to support a small processing industry that relies on canned artichokes for the production of anti-pasto products. Such products are marketed locally and/or exported at a much higher price than the imported primary material. Furthermore, there is a certain lack of vision in addressing the export opportunities and economic consequences of adopting new value adding and marketing strategies that are at the moment untapped by growers and processing firms.

The aim of this project was to:

- a) Describe the current state of the globe artichoke industry and identify the barriers obstructing the increase in local consumption and export opportunities,
- b) Develop a protocol for a frozen artichoke and other value-added products,
- c) Assess consumer's knowledge of fresh artichoke and acceptance of value-added products and
- d) Document to the industry the achievable benefits of processing as a viable and complementary alternative to its present focus on the fresh market.

The nature of this investigation dictated the use of four different research methodologies that focussed on: a) Collecting quantitative information and statistics by interviewing growers and food service operators to ascertain their views on their respective industries and future vision; b) Experimenting with various anti-browning and processing treatments to test their efficacy in controlling enzymatic browning of fresh artichoke hearts destined for processing by freezing; c) Determining consumers' acceptance of a processed products through panels of assessors asked to indicate their level of preference for some sensory characteristics of the processed product and d) Documenting the economic benefits to the artichoke industry and reviewing its capacity to accommodate a local processing industry as a viable and complementary alternative to its present focus on the small and static fresh market.

Our investigation showed that the artichoke industry in Australia is small by world standards and consists mainly of traditional family farm units clustered in Victoria where 90% of the annual crop (1300 tonnes) is produced. Production varies from year to year depending on the number of growers entering or exiting the industry. The bulk of the production is destined for the local fresh market with sporadic exports to hospitality trades in the Asia/Pacific region.

An estimated 700 tonnes of processed artichoke products are imported annually to satisfy mainly the need of a local processing industry. The reliance on imported material is due to a shortage of local supply and the cheaper prices of overseas products. However, local processors have expressed interest in buying locally, provided they can be guaranteed a continuation of supply at prices comparable to the imported material.

Besides the possibility of achieving import replacement, our investigation also showed that some value adding concepts such as plain frozen artichoke hearts (ready to cook) as well as cooked and frozen versions (ready to heat and eat) are technically feasible, convenient for consumption and accepted by consumers. Such concepts, if adopted, would considerably improve the local marketability and increase the export potential of globe artichokes.

Further work is required to bring the value adding concepts reported in this project to realisation and commercial adoption by the processing industry. Moreover, in order to help achieve this aim, the artichoke industry will need to re-assess its existing local fresh market orientation and re-adjust itself to meet the expected increase in requirements of a local processing industry. Paramount in this regard will be issues such as introduction of varieties suitable for processing, mechanisation, seasonality and economies of production among other issues.

Despite its small size by world standards, the Australian artichoke industry has the necessary expertise and capacity to expand if these and new market opportunities are exploited to their full potential.

3. Literature Review

3.1 Introduction

While the volume and variety of vegetables offered to Australian consumers have increased dramatically over the last 20 years, the interest in some such as the globe artichoke has remained almost static. This is in spite its versatility as a vegetable and its well documented excellent health benefits. In Australia, the interest in globe artichoke (particularly in its fresh form) remains largely restricted to particular ethnic groups who are familiar with its use. This could be attributed to a number of reasons such as unfamiliarity of the majority of consumers with this vegetable, difficulty in its preparation, competition from processed forms of the product and lack of promotion of artichokes on domestic markets.

This project aimed at: a) Describing the current status of the Australian globe artichoke industry and identifying the major barriers to its expansion b) Identifying local and export market opportunities c) Testing the technical feasibility and development of value added artichoke products d) Assessing the consumer's acceptability of such products. The project aimed also at documenting to the industry the achievable benefits of processing and value adding as a viable and complementary alternative to its present focus on the limited and unpredictable fresh market. The project also touched on the import replacement issue and reviewed the capacity of the artichoke producers in meeting the requirements of a local processing industry. Furthermore, as part of this project, an overseas visit was undertaken by the principal investigator to attend the 4th International Congress on Globe Artichoke in Italy and to review the progress in artichoke processing in two leading countries in this field (see summary report in Appendix 8).

The final outcome of the information gathered will be a re-positioning of the globe artichoke industry to increase production in the face of an anticipated increase in local consumption and export opportunities.

The approach taken in this project for solving the problems associated with a crop such as globe artichoke could be applicable to other marginal vegetable crops. Therefore, it is hoped that this report would be a stepping stone for the initiation of further research projects that address value adding and marketing in other vegetable crops with similar predicaments to globe artichoke.

3.2 Botany and agronomy of globe artichoke

The globe artichoke (*Cynara scolymus*) belongs to the compositae family and is one of the few vegetable crops that can be grown as an annual or as a perennial. It is native to the Mediterranean region, possibly the Middle East, hence the Arabic origin of the name (ardichoki) meaning "earth thorn" (Simpson and Ogorzaly, 1995). The genus *Cynara* comprises seven wild species also native of the Mediterranean basin with the wild cardoon (*Cynara cardunculus*) considered the closest relative and the primary wild gene-pool to the cultivated globe artichoke (Rottenberg and Zohary, 2000). The globe artichoke should not be confused with the Jerusalem artichoke (*Helianthus tuberosus* L.) a plant native to the Americas and related to the sunflower (Schultheis, 1999) or the Chinese artichoke (*Stachys sieboldii* Miq.), both of which are grown for their edible tubers. From its origin as a wild plant, the globe artichoke has developed to become a luxury vegetable as we know it now, cultivated for its edible immature floral bud (head) which is available from late autumn to early spring (Plate 1).

Artichoke is a cross pollinated plant that can be propagated vegetatively as a perennial crop (using stumps and offshoots) or as an annual crop (using seeds). However, in some overseas countries (eg. Italy, France and Egypt) tissue culture is fast becoming an acceptable alternative to the traditional propagation techniques especially for the production of virus free material. Regardless of the propagation technique used, it takes between 5 to 7 months for a plant to produce heads ready for the first cut. Some overseas countries rely on foliar applications of growth hormone sprays (eg. gibberellic acids) to increase earliness and the uniformity of bud development. The plant grows well in a range of soil conditions providing they are fertile and well drained and prefers coastal areas with a mild frost-free climate with temperatures between 15 to 20°C during bud formation in spring. Spacing between rows and plants will determine the size of the heads on the plant and the final number of plants in a field. Ryder et al. (1983) reviewed estimates for plant spacings which optimise total yield/unit area for a number of artichoke producing countries. These estimates varied between countries and ranged from 0.18m²/plant in Egypt to 0.9m²/plant in USA (California). However, the authors maintained that increasing density generally decreased the yield/plant. Normally density would range between 3000 to 6000 plants/ha.

There are a number of world wide artichoke cultivars with considerable morphological variation such as size, bud shape, colour and spininess of the bracts. Many cultivars are synonym, with some in Italy having up to fifteen different names given after the areas where they are grown (Prof. V. Bianco, personal communication). Major research centres for breeding and cultivar selection exist in Italy, Spain and France. A comprehensive collection of over 130 cultivars collected world wide is kept at the Germplasm Institute, Bari University in Italy. Di Venere et al. (2000) found remarkable differences in the biochemical constituents of 35 artichoke cultivars. According to the researchers such useful information could help determining the suitability of various cultivars to specific uses such as fresh, frozen, brined or preserved in oil.

3.3 World production

In 1999 the world's production of artichoke was about 1.2 million tonnes from an area of 119,000 hectares (Anon. 1999a). Nearly 85% of the world's artichokes are grown in countries bordering the Mediterranean basin (Bianco, 2000). Italy and Spain dominate the world production with other countries showing great interest in the crop. In the Northern hemisphere, Egypt is expanding its production ranking fifth in the world and becoming an aggressive exporter to markets in Europe and Northern America. The USA has also been expanding its production steadily with most of it located in the central and southern coastal areas of California. Argentina and Chile are two Southern hemisphere countries showing interest in expanding their artichoke production. Table 1 lists the world top producing countries in 1999 and periods when the crop is available on their local markets. However, the dates listed are only a guide and could differ by a few weeks within the same country depending on the region where artichoke is grown and/or prevailing weather conditions during the growing season.

Table 1. Major World Producers of Globe Artichoke.

Country	Area harvested (ha)	Production (t)	Availability of Crop*
Italy	51,000	472,000	October to March
Spain	18,000	254,000	September to April
France	13,000	73,000	April to November
Argentina	5,000	85,000	June to October
Egypt	3,000	57,000	October to April
USA	5,000	51,000	October to March
Algeria	4,000	30,000	September to March
Morocco	2,000	28,000	September to April
Turkey	2,000	27,000	November to June
Chile	3,000	24,000	June to October
Greece	2,000	23,000	October to May
Tunisia	3,000	25,000	September to April
Peru	Not available	4,000	June to October

Source: FAO Production Yearbook Vol. 53, 1999

* Dates compiled by the authors

** Figures provided have been estimated

Major world producers put great emphasis on maintaining a good stock of cultivars and continuously breeding and selecting hybrids for particular characteristics such as earliness of production, head size, yield and colour. The following are the major cultivars grown in some of the leading producing countries including Argentina, a country considered a competitor to Australia given the similarity of seasons.

Italy: *Romanesco, Violetto di Sicilia, Violetto di Provenza* (known for its earliness and high yield) *Orlando, Spinoso violetto di Palermo, Spinoso Sardo*. Some recently selected cultivars are; *Apollo, Etruso, Moro di Corneto, Branco Star, Pacific, Latino*.

Spain: *Blanca de Tudela* (early producer, represent 90% of the production), *Moretto, Camus de Bretagne*.

France: *Camus de Bretagne, Castel, Violet de Provence, Calico, Salumbo, Popvert*.

Argentina: *Nato, Blanc Hyerois, Salanquet, Frances* (represent 90% of artichoke areas), *Oro Verde, Blanco de San Juan, Esmeralda, Camus de Bretagne, Violet of Provenza, Italiano*.

USA: *Imperial Star, Green Globe, Emerald, Grand Beurre, Tolpiot, Purple Sicilian*.

Egypt: *Baladi, Fransawee, Imperial Star, Large Green, Green Globe, Violet, Grand Beurre*.

3.4 The artichoke industry in Australia

Claims are made that artichokes were introduced to Australia by the first fleet in the first year (1788) of European settlement in Australia and that seeds were planted on Norfolk Island (Anon., 2000a).

Italian growers in Victoria around the late 1940's and early 1950's first grew the globe artichoke commercially in Australia. The bulk of the artichoke crop in Australia has been grown close to the shores of Port Phillip Bay at Werribee South in Victoria (Sutherland, 1995). This is because the crop favours coastal climatic conditions. However, varieties are being developed in California for broad climatic adaptability (Anon., 1998a).

Dr.S.C.Tan and Mr H.Hoffmann in Western Australia are also looking into suitable U.S. cultivars for that state (Horticulture Australia Limited, project No.VG97042). In Italy researchers have found remarkable differences in the biochemical constituents between different cultivars (Venere et al., 2000). According to this research this variability could be a useful indicator of the suitability of various cultivars to specific uses (eg. fresh, frozen, preserved in oil etc.). Unlike in overseas countries where a broad gene pool of cultivars exists, in Australia there is a serious shortage of reliable cultivar material. Some of the popular cultivars currently used by many growers, such as Green Globe and Purple Globe are of unknown origin. The majority of growers appreciate the practicality of using seeded cultivars that are currently available. However, few are currently experimenting with such cultivars to test their general performance and reliability.

Various recent publications refer to Australian artichoke production as being steady at 500 tonnes. However, based on the information gathered in our investigation, the artichoke production figure is more like 1300 tonnes (see section 5.1.2). Despite this small production compared to some overseas producers (Table 1), Australia manages to export small volumes of fresh artichokes in an ad-hoc fashion mainly to hospitality trades in the Asia/Pacific region. Trade figures, show that between 1994/95 and 1999/2000, the volume of globe artichokes (fresh or chilled) exports ranged from a low of 2.5 tonnes (\$A5580 per tonne f.o.b.) in 1995/96 to a high of 80 tonnes (\$A3342 per tonne f.o.b.) in 1999/2000 (Anon., 2001a). Statistical Information Service). The statistics also show that Australia's four major exports markets in 1999 were Taiwan, New Caledonia, Singapore and Brunei. Other markets include: Japan, Singapore, China (Hong Kong), Korea, Malaysia and Germany.

3.5 Uses and health benefits

Various parts of the globe artichoke can be used in different ways and for different purposes. The principal edible portion of the immature flower bud we call the artichoke's heart is composed of the fleshy bracts and the receptacle to which the bracts are attached. This part is consumed in a number of ways, such as steamed, boiled, stuffed and then baked, marinated and battered and then fried etc. Another part is the artichoke stalk which when peeled exposes its core, another edible portion of the plant that has a similar texture and flavour to the heart. A favourite Italian way of eating artichoke is "in pinzimonio" which involves dipping the fleshy parts of the bracts one by one into a vinaigrette dressing mixture as above and scrapping it off between the teeth. Besides fresh, various forms of processed artichoke are available on the markets such as preserved whole hearts in brine, frozen and antipasto (appetiser) products, purees (Plate 2).

Globe artichoke is a versatile vegetable, renowned for its nutritional value and excellent health benefits because of its high fibre, vitamin and mineral content, especially iron (Appendix 1). This is in addition to its high content of phytochemical or nutraceutical substances with medicinal functions such as caffeoylquinic acid and cynarin. It is well documented that extracts of globe artichoke leaves are known for their ability to detoxify the liver and stimulate bile secretion (Wegener and Fintelmann, 1999) and to inhibit cholesterol biosynthesis (Gebhardt, 1998). In Argentina, growers can generate additional income from selling artichoke leaves (1.5-3.0 kg per plant at approximately \$A1.00 per kg) to the pharmaceuticals industry (Garcia et al.2000). Cardinali et al., 2000 have shown that the leaves and external bud bracts (which are discarded as waste during processing) represent about 70% of the total biomass and could be utilised to extract important phytochemical compounds. Almela et al., 2000 found that artichoke waste is a valuable material that could be used for animal fodder due to its high total protein content, which is comparable with other

sources of animal feed. Work on animal nutrition in Italy has shown that adding artichoke bracts to lambs' feed led to the lowering of fatty acid components and cholesterol in the meat produced (Marsico et al., 2000).

3.6 Food trends and consumption

Changes in consumers' lifestyles including buying and eating habits are occurring at a fast rate in many developed countries. Australia, according to the vegetable industry strategic plan, has undergone significant demographic changes that have brought a diversity of food which modified consumers behaviour and lifestyle trends (Anon., 1999b). These changes could also be partially attributed to the global economic transformation and the information revolution that is taking place at a fast rate. With the health message becoming widely spread and more noticeable, consumers are turning more to fruit and vegetables and away from meat and dairy products. In the USA, red meat consumption declined 17% over a period of 30 years from 79% in 1970 to 62% in 2000 (Anon., 2001b).

Between 1955 and 1995, the Australian per capita consumption of total fresh vegetable has increased by 39% (from 117 to 163 Kg) (Anon., 1998b). 1997/98 Horticultural Statistics Handbook. Australian Horticultural Corporation, Sydney). Reports from the USA put the yearly per capita consumption of artichoke at 272g (Anon., 1999c), about ten times that of Australia (28g) (Hoffmann, 2000), whereas in a country like Italy per capita consumption of artichoke is 7kg (Bianco, 2000).

Analysing food trends around the world, Daly et. al. (1997) found that leading vegetable producing countries are increasingly relying on value adding of products. The study also found changes in consumer behaviour which is having an impact on the vegetable sector such as an increasing trend towards convenience foods (eg. supermarkets offering "meals to go" "heat and eat" etc.). While at the moment Australian consumers lack awareness of such meals, there could be a big opportunity for hotels and restaurants (George, 2000). Market research claims that Australian shoppers will be able to order over the fax or phone convenience meals from a new breed of supermarkets (Anon., 1998c). Recent reports indicate that Australians already spend more than \$920 million a year shopping on-line for convenience, a figure that's set to skyrocket in the future (Sloane, 2000). A similar study by Hughson (1997) shows scope for the introduction of new frozen value-added vegetables products. Between 1984 and 1990 sales of frozen meals in Australia grew from \$10 million to \$80 million (Anon., 1995). Australians consume about 500 grams of frozen meals per capita per annum well behind the UK (1000 grams) and the USA (2000 grams). The frozen meals market in Australia has a retail value of \$100 million (Quinton Wilkinson, personal communication).

Changes in food consumption patterns due to changes in lifestyle are also taking place in overseas countries. For example in Japan (a major market for Australian food exports) where demand for fast and convenience foods is increasing. The quantity of frozen vegetables imported over a period of eight years from 1988 and 1996 increased by 90% (from 333,709 tonnes to 633,008 tonnes) (Nguyen, 1998). The import of processed artichokes to the USA increased by 89% from 19,157 tonnes to 36,284 tonnes (Hofmann, 1999-personal communication).

3.7 Anti-browning compounds

The fruit and vegetable processing industry is undergoing constant development in response to the ever increasing demand for high quality convenience products. Processing involves various operations such as cutting, trimming and peeling, all of which induce discolouration

and browning of the tissue (due to various enzymatic and non-enzymatic reactions) which is a major problem that occurs especially during the freezing process. While the enzyme polyphenol oxidase is considered the major one responsible for tissue browning in artichoke, there are indications that other enzyme systems such as peroxidase could also be contributing to the total discolouration in some fruits and vegetables (Vamos-Vigyaso, 1981). It is generally accepted that during artichoke processing the cell damage that occurs leads to dark colouration of the tissue which is due to the reaction of phenolic compounds such as caffeoylquinic acid with ferric iron (Hughes et al., 1962; Mathew and Parpia, 1971). One of the main purposes of this study was to experiment with various anti-browning compounds to find the most effective in controlling browning of artichoke during the freezing process. It is known that anti-browning compounds can be used singularly or in combination for their synergistic effect (Son et al., 2001). A large number of approved food additives have shown various degrees of inhibitory effects such as citric and ascorbic acids on carrambola (Weller et al., 1997), L-cysteine and citric acid in potatoes (Gunes et al., 1997), acetic acid in Lettuce (Tomas-Barberan et al., 1997) and citric acid and ascorbic acid in artichoke (Lattanzio et al., 1989). Another technique used to inhibit enzymatic browning is blanching in plain water heated to various temperatures or water mixed with organic chemicals to enhance the blanching effects. Toivonen (1992), working on enzymatic browning in various parsnips cultivars, concluded that the effectiveness of anti-browning agents is limited by the extent of the injury sustained by the particular cultivar.

7. Recommendations

The local globe artichoke industry possesses the necessary expertise and reasonably modern modes of production to enable substantial expansion of the industry. Through its evaluation of the local production scene, this investigation has been able to identify several existing problems and propose promising short and long term solutions that are available to the industry. Such solutions, if properly adopted by the industry, would increase the profile of its product locally and capture a share of overseas markets. The following are some of our recommendations in this regard.

In the short to medium term globe artichoke producers will need to re-vitalise the local fresh market which will remain relatively small but has the potential to expand. This will require:

- a) The introduction of appealing and consistent quality cultivars to ensure consumer satisfaction and repeat purchase.
- b) The involvement in and adoption of promotional activities to build up the industry's profile and that of the fresh crop. This will include developing a good working relationship with supermarkets to train staff on how to handle the produce, to develop attractive point of sale material such as recipes.

At the present time there is a certain lack of vision in the artichoke industry with respect to investigating and adopting new processing techniques for fresh product and remains untapped by local growers and processing firms. This study recommends that for the long term growth of the artichoke industry, the fresh market will have to be supplemented by a viable processing sector that could rely for its supply on a strong and reliable local production. Processing could start by targeting local and exploring overseas niche markets. As the demand for fresh and processed products increases growers will be able to make informed decisions as to whether to produce for processing, fresh or both markets.

Given the small and fragmented nature of the globe artichoke industry in Australia, individual growers do not have the necessary production capacity or marketing solidarity to develop a viable industry. Therefore, industry members interested in processing will need to coordinate their efforts in terms of production and marketing and if necessary take a cooperative approach.

Furthermore, the industry needs to be attuned with the current overseas views and future trends of their industry at an international level. Such views were expressed at the recently held Fourth International Artichoke Congress (Italy) and include:

- More research needed to improve propagating material.
- Selection of seed propagated cultivars that mature during autumn.
- Characterise cultivars according to suitability for consumption and end use such as fresh or processing.
- Better understanding of the role of growth regulators in production.
- More work in postharvest physiology to increase storage life.
- Better understanding of enzymatic activities and utilisation of by-products and identify the potential for phytopharmaceuticals.
- More research in food technology to develop ready to use and minimally processed products.

8. Technology Transfer

The Australian globe artichoke industry, ancillary industries (Food service etc.) and Horticulture Australia Limited (HAL) were kept abreast of the developments and progress made during the course of this investigation in the form of written progress reports and meetings. Furthermore, the vegetable industry development officers in all states growing artichoke were briefed about the project since its initiation and kept informed about its development. However, due to the commercial sensitivity of the results, especially those associated with the processing aspect of the investigation, little detail has been published and public disclosure will be kept to a minimum until the final report is cleared by HAL.

During the course of the investigation the following extension activities have been conducted:

Industry contacts and briefings.

Australian Restaurant and Catering Association contacted.

Twenty food processors briefed and invited to express views on project.

State vegetable IDO's contacted and summary of project brief forwarded for publication.

Further contacts were maintained to keep IDO's abreast with progress made.

Contacted wholesale market officials (eg. Sue Dodd, Sydney market; Noel Harvey, Qld. Fruit and Vegetable Manager; Lisa-Huong Nguyen, SA-Virginia Hort. Centre).

Communication established with members of the food and hospitality service (Chefs/Restaurant manager's etc.).

Publications.

Newsletter produced and distributed quarterly to 40 growers and processors.

State wide media releases sent and published in written media such as Shepparton News, Country News and Southern Farmer.

Article published in VegeLink newsletter.

Article published in Proceedings of Fourth International Artichoke Congress (Bari-Italy).

Article printed in "Good Fruit and Vegetables".

Two articles printed (artichoke recipes and summary of consumer research) in WA Vegelink (insert in WA Grower) in December 2000.

Article prepared for media release "Frozen artichokes - a cool alternative" to promote a processed artichoke and to entice potential investors to express their interest in commercialising the technique.

Submission of abstract for a poster presentation on processed artichokes at the forthcoming Australian Postharvest Conference (23-28 September, 2001) in Adelaide.

Article on the convenience of a processed artichoke product printed in the new VegCheque newsletter (Vegetable Matters).

Growers meetings.

Meeting and briefing Agmark's chairman, growers, distributor and marketing agent.

Two meetings with Werribee's young vegetable growers.

Field Days and Promotional activities.

Presentation and circulation of handout at monthly meeting of Werribee Grower Group.

Promotion of artichoke project in a display at the IHD open days (Oct. 6-7) for both industry and the public.

Poster presentation at the Horticulture in NRE conference at the Institute for Horticulture Development (Sept. 6-7).

Poster presentation at the Gympie (Qld.) VGA field day (Nov. 15).

Artichoke poster displayed at the Werribee Expo on 3 and 4 May, 2001.

Promotional posters were also displayed at The Horticulture Conference held at the Department of Natural Resource and Environment (Knoxfield).

International Exhibitions and Conferences.

Poster presentation at the IV International Artichoke Congress (Bari- Italy).

Translation of poster from English to Japanese on 2 stands to promote Australian artichokes at the 10th International Food Fair (Oct. 5-9) held at Kitakyushu (Japan). A local TV crew filmed the poster.

Liasing with artichoke growers, agribusiness section and Australian export company to set up a live exhibit of Australian artichoke at the above event.

Export of a sample of frozen artichoke hearts to Japan for comments by the Head Chef of a large Italian restaurant chain and to explore the acceptability of the product in that market.

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