**Submission No 2**

# INQUIRY INTO ASPECTS OF AGRICULTURE IN NSW

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**Date received**: 25/07/2007

DemandFarming Australia

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27th June 2007.

Dear Mr. McDonald

## Submission seeking approval to commercialise Industrial Hemp in NSW

### Introduction

This submission is to request NSW Department of Primary Industries implement a coordinated interagency proposal to have legislation amended to allow commercialization of industrial hemp in NSW. This crop is estimated to have immediate potential of approximately 30,000 ha of production worth some $50-100 million farm gate revenue seasonal dependant.

This paper provides information relating to the industrial hemp industry and of particular interest are the issues that may affect the development of the industry in the New South Wales and the outcomes in relation to the change in legislation (Drug Misuse and Trafficking Act 1985) for the commercial cultivation, manufacture, value add, marketing and exporting of raw and manufacture Industrial Hemp products in forms of hemp fibre and seed.

### Background

Industrial hemp (Cannabis sativa L.) is also known as 'Indian hemp', 'cannabis' or 'hemp'. The plant has a long history and has been used for its bast (phloem) fibre in the stem, the multi-purpose fixed oil in the seeds (achenes), and an intoxicating resin secreted by epidermal glands (Small and Marcus 2002). Items manufactured from it include food, textiles, paper, rope, fuel, oil, stock feed, medicine, and spiritual and recreational products. It is thought that C. sativa was one of the first plants to be cultivated, and there is general agreement that the plant species originated in China, where the greatest diversity of germplasm is found.

Early in the 20th century, industrial hemp was considered to be an important and beneficial crop throughout the Western World. However, as a result of the development of synthetics and its classification by the Western world as a drug in the 1920-30s, the production of industrial hemp was confined to India, Bangladesh and Eastern Europe.

Since the late 1980s there has been a resurgence of interest in fibre products, arguably driven by the green movement with a view to saving trees by growing renewable non-wood fibres in place of clearing forests for paper and building materials. This interest has gained momentum and credibility with Japan, for instance, setting a target date of 2010 to have 10% of its paper production sourced from non-wood fibre sources. Furthermore, the European Union has stipulated to its member countries that 95% of the components of each car produced by 2015 must be recyclable. The voluntary use by automotive manufacturers of natural fibres, including industrial hemp, suggests that demand for natural fibres will continue to increase. Market segmentation for ethically produced goods and growing support for biodegradable and natural products has led to a wide range of new industrial hemp products being developed. Hemp was promoted as the ultimate crop from an economic and environmental perspective requiring fewer pesticides as well as being a panacea for soil-borne disease and returning competitive returns to that of current summer cropping options.

The legalisation of growing industrial hemp in some Australian states in recent years is recognition by government and the general community that industrial hemp may make a useful contribution to the economy as an alternative agricultural crop and that the crop can be grown under conditions that do not compromise law and order. Because there is no national policy for the crop, only ad hoc experimental trials and small-scale production have ensued. Licensing systems to allow for the commercial production of industrial hemp were first developed in Tasmania from 1991 and later in Victoria from 1997. Interest in the crop has declined in these states in recent years due to uncertainties about financial returns, marketing, and regulation. In Queensland, amendments to the Drugs Misuse Act 1986 were proclaimed in September 2002 to facilitate the commercial production of fibre and seed from industrial hemp crops. Legislation to allow for the development of a commercial industrial hemp industry in Western Australia was passed in early 2004. Field trials have been conducted in NSW each year since 1995 and changes to the legislation in that state are now being sought with the view to commercialisation of the industry. It appears that Governments in South Australia and the Northern Territory are not proceeding to legislate for the commercial development of the industry at this stage.

**Agronomy**

Industrial hemp requires well drained fertile, neutral to slightly alkaline, clay loam or silt loam soil. The requirement for a well-drained site is necessary as industrial hemp plants are particularly sensitive to waterlogged soil.

Varieties currently grown in Europe are more suited to the growing latitudes of Tasmania or southern Victoria and may not be as suited or be adaptable to northern NSW or Queensland. Varieties are being grown by a number of research businesses in southern NSW and southern QLD with stable Low THC concentration, high fibre quality and exceptional yields, even as high as 10-20 tonnes per hectare of dry matter, making them a very lucrative crop (see Gross margins attached in Appendix)

Breeding programs for industrial hemp varieties suited to NSW are being conducted by a number of private businesses with very minor assistance and guidance from NSW DPI or other relevant Government authorities. Recent trials show that these research companies are delivering lines upon which a viable industry can be based in all the eastern states of Australia to say the least.

Sowing is well suited to the current farming systems of minimum and zero tillage practices, as the seeds have good early vigor and can be planted using the current farming equipment, so minimal additional capital is needed in the cultivation of the crop.

Industrial hemp has a reputation for being resistant to pests and disease, although the degree of resistance has been widely exaggerated, with the crop playing host to several insects and fungal pathogens. Grey mould, caused by the fungus Botrytis cinerea, is one of the most significant diseases associated with industrial hemp, and there are nearly 300 pests worldwide, the most serious of which are the European core borer (Ostrinia nubilalis) and the hemp borer (Grapholita delineana), not known to be a problem insect in Australia. Green vegetable bug (Nezara viridula Linnaeus), heliothis moth (Helicoverpa spp), and monolepta beetle (Monolepta australis Jacoby) have been found in crops of industrial hemp grown for fibre in Queensland, but appear not to have had a significant impact on yield, possibly because the rapid growth of the crop tends to minimise the effects of pest damage. However, damage to the terminal buds of plants, particularly from heliothis moth, may require strategic pest control intervention primarily to the crops grown for seed. Crops grown for fibre only have minimal to no insect pest issues and the crop is one of the quickest maturing plants known and threshold levels of insects known would not harm potential yields. The Monolepta beetle was reported to have defoliated a large proportion of the industrial hemp plants grown in a trial conducted in the Hunter Valley, however the crop was very poorly managed and was not irrigated with poor fertilizer management which did not maximize the crops potential.

Under optimal growing conditions, such as a well-prepared seed bed, adequate soil moisture, rapid germination, and a high plane of nutrition, canopy closure normally occurs 5 to 7 weeks after sowing. This competitive ability of industrial hemp plants against weeds usually obviates the need for herbicide application during the life of the crop. However, sound agronomic practices for weed management prior to planting need to be followed to reduce the competitive effect from the weed population early in the life of the crop, which is currently best practice for a large proportion of the farming community and is of high management importance for all of the Demand Farmers.

There are no pesticides registered or available for use under off-label permit in industrial hemp in Australia. Therefore, no pesticide may be legally applied to the crop. However with expanding interest in the crops potential interest, permits for products known to be used in other countries would be achieved with little effort.

For fibre production, industrial hemp plants are normally cut in the early flowering stage or while pollen is being shed, well before seeds are set. Trials show that stem, bark and fibre yield of industrial hemp plants reached their maximum at the time of flowering of the male plants, a stage of development that was called 'technical maturity'. Mechanical harvesting trials have been conducted in Queensland with great success using a variety of machines and set ups all dependant on the degree and type of manufacture to take raw material to the markets specific needs.

**Market Demand**

Industrial hemp products have found a place in niche markets in the developed world. There is speculation of more opportunities in the future, with some industry proponents estimating the international market for bast fibre to increase from 100,000 tonnes in 1999 to over 20 million tonnes by 2050. However, the prediction of market size has been fraught with difficulty in the past, with a dramatic over-estimation of market potential by Canada in the late 1990's, with around 14,000 hectares grown (Industrial hemp in the United States: Status and Market Potential, USDA Report). The degree to which industrial hemp will meet market demand will depend on demonstrable proof that its products are of equal or superior quality to its competitors, at equal or reduced costs in adequate and consistently available amounts.

Demand Farming has engaged a number of domestic and international customers who have been seeking volumes of traceable quality assured product to move into the ever increasing environmentally aware market place. End use products such as pelletising the bast fibre with Polypropylene plastics for car infill panels for Mercedes and BMW are export markets that we have had detailed communications and a domestic market using bast fibres to mix with wool and make

high end garments in regional NSW to mention a few. The building materials are undergoing full testing and trademarks and have been applied for and testing has revealed greater insulation characteristics than the bricks and paneling currently on the market.

**Products and markets**

Traditionally, products made from industrial hemp fibre included rope and cordage, sailcloth, carpet backing, canvas, and apparel (such as the original Levi jeans made from hemp denim). Recent investigations have revealed that contemporary uses of industrial hemp include reinforcing fibre for paper, fibre-reinforced plastics, polycomposites, fibreboards, geotextiles, textile fabrics (apparel and industrial), animal bedding, kitty litter, industrial absorbent products, and insulation. Many uses for the oil and seed have been developed or are under investigation, including animal stockfeed, soap, oil, paint and varnish, and cosmetics. In some countries, (not Australia), the seed and oil from hemp plants are used in food products.

In the European Union, cultivation of industrial hemp is more heavily weighted towards fibre than towards oilseed, with the production of about 27,000 tonnes of fibre versus only about 6,200 tonnes of seed in 1999 (Karus et al. 2000, cited Small and Marcus 2002). Conversely, the oilseed industry is the primary focus in Canada in recent years, with the breeding of new varieties and the development of improved technology for growing, harvesting and processing.
Some of the products into which industrial hemp plants can be or are being made are listed below, and, where appropriate, mention is made of present markets or future market possibilities.

**Textiles**

The history of textile production is rich and varied, with some 2,000 plant species having been processed into fibre at one time or other (Graham 1995). Based on world production of fibre in 1999, 54.5% was synthetic (of which 60% was polyester), 42.9% was plant-based (of which 79% was cotton), and 2.6% was wool (Karus 2000, cited Small and Marcus 2002). In terms of plant fibre production other than cotton, flax is the only significant plant fibre crop and held 2.7% of the world plant fibre market. Only 0.3% of the world plant fibre production was derived from industrial hemp in 1999.

For industrial hemp, the most desirable long fibres for textiles are found in the stem near the phloem tissue in the bast. Industrial hemp long fibre requires retting for preparation of high quality spinnable fibres for the production of fine textiles. Steam explosion is a technology that has been experimentally applied to industrial hemp (Garcia-Jaldon et al. 1998). Using this technology, decorticated crude fibre is subjected to pressurise steam at high temperature to explode (separate) the fibres, resulting in hemp fibres that are thinner than those obtained from water retting. Small and Marcus (2002) viewed the refinement of equipment and new technologies as offering one possibility of making fine textile production from industrial hemp in developed countries, but noted that at present, China controls this market, and probably will remain dominant for the foreseeable future. Indeed, in the absence of the development of new technologies, Small and Marcus (2002) considered that the concentration of spinning facilities and extraction technology in China, in addition to cheap labour, were major impediments for the production of industrial hemp fabrics outside of that country.

**Pulp and paper**

The pulp and paper industry is currently based on wood fibre. Although industrial hemp fibre has been considered for use in pulp, it has only been used on an experimental basis (Small and Marcus 2002). Since virgin wood pulp is required for added strength in the recycling of paper, the long fibres of industrial hemp could make paper produced from hemp fibre at least two times more recyclable than paper produced from wood fibre. However, various analyses have concluded that the use of industrial hemp for conventional paper pulp is not profitable (Fertig 1996). Indeed, because of a number of economic and structural issues, the use of fibre from industrial hemp for

paper manufacture was considered to be unviable by Australian Newsprint Mills (now Norske Skog) in partnership with the University of Tasmania between 1993 and 1996 (pers. comm. Joe Horak, DPIWE Tasmania). The lower competitiveness of hemp as a source of paper pulp than that of wood sources was highlighted by Vantrese (1998), who reported an estimated price for hemp pulp of US$2,100 per tonne, compared with the price for bleached softwood pulp at a much lower US$800 per tonne.

Conversely, specialty pulp products made from industrial hemp, including cigarette paper, bank notes, technical filters, hygiene products, art paper, and tea bags, are believed to offer a highly stable, highly-priced niche market in Europe, where industrial hemp has an 87% market share of that sector (Karus et al. 2000, cited Small and Marcus 2002). EIHA (2003) estimated that 17,000 tonnes of hemp fibre produced by affiliates of the European Industrial Hemp Association was used for pulp and paper applications in 2002.

#### Panels, plastics and Moldings

Fibres may be introduced into plastics to improve their physical properties, such as stiffness, impact resistance, bending and tensile strength (Bolton 1995). Although manufactured fibres of glass and carbon are most commonly used, plant fibres offer considerable cost savings along with comparable strength properties. In the European Union, natural fibres are used in the molded composites of automobiles to reinforce door panels, passenger rear decks, trunk linings, and pillars. In 1999, over 20,000 tonnes of natural fibre was used for these purposes in Europe, including about 2,000 tonnes of industrial hemp (Small and Marcus 2002). Kaup et al. (2003) reported that the amount of hemp used for automotive composites in Germany and Austria increased from zero tonnes in 1996 to an estimated 2,200 tonnes in 2002. Total use of natural fibres for automotive composites in these two countries increased over four-fold in the same time period (from 4,000 to 17,200 tonnes). It has been estimated that 5 to 10 kilograms of natural fibres can be used in the moulded portions of an average automobile (excluding upholstery).

Based on the present production of 16 million vehicles per year in Western Europe, Kaup et al. (2003) predicted a market potential of 80,000 to 160,000 tonnes per annum for natural fibres in press molding in that region, with an annual growth rate until 2005 of 10 to 20% for the use of natural fibres in composite materials.

#### Building construction products

Small and Marcus (2002) stated that the market for thermal insulation products in Europe is growing fast due to the high cost of heating fuels, ecological concerns about conservation of non-renewable resources, and political-strategic concerns about dependence on current sources of oil. According to Karus et al. (2000, cited Small and Marcus 2002), it has been predicted that tens of thousands of tonnes of thermal insulation products (composed of industrial hemp and flax) will be sold in the five-year period from 2000 to 2005.

Industrial hemp fibres added to concrete increase tensile strength and reduce shrinkage and cracking. Fibre from industrial hemp is produced at a much higher cost than that from wood chips or straw from other crops. Given the greater strength of industrial hemp fibre than fibre from wood chips or straw, industrial hemp fibre may be more appropriately used in building materials requiring a high tensile strength.

#### Animal bedding/ industrial absorbent product

Animal bedding products made from the hurd (inner woody core of the stem) of industrial hemp plants can absorb up to five times their weight in moisture, do not produce dust, and are easily composted. The high absorbency of hemp hurd has also led to its occasional use as an absorbent for oil and waste spill cleanup. Small and Marcus (2002) attest that because hemp hurd is costly to produce (and animal bedding is a higher value use than industrial absorbent products), it is likely

that animal bedding will remain the most important application of this product. An estimated 29,000 tonnes of hemp shives produced by members of the European Industrial Hemp Association were used to make animal bedding in 2002 (EIHA 2003).

#### Geotextiles

Geotextiles include ground-retaining, biodegradable matting designed to prevent soil erosion, especially to stabilise new plantings while they develop root systems along steep highway banks to prevent soil slippage, or ground covers designed to reduce weeds in planting beds. The economic viability of using industrial hemp for geotextile applications is yet to be determined. However the relatively high cost structure would suggest that it may be difficult for industrial hemp to penetrate this market.

#### Stockfeed

Expression of oil from the seed of industrial hemp plants leaves behind a protein-rich, oil-poor seed cake, also referred to as 'seed meal'. This seed meal has proven to be an excellent source of nutrition for animals (Mustafa et al. 1999), and does not contain THC, which is present in the leaves and flowering heads of industrial hemp plants. EIHA (2003) estimated that seed meal from 5,000 tonnes of hemp seed produced by members of the European Industrial Hemp Association was used

#### Food in the human diet

Despite the restriction in Australia, about half of the world market for oil extracted from industrial hemp seed is currently used for human food and food supplements (de Guzman 2001). In North America, many of the products from the seed are incorporated into food preparations such as snack bars, bread, pretzels, biscuits, yoghurts, pancakes, porridge, ice cream, pasta, pizza, salad dressings, mayonnaise and beverages (Small and Marcus 2002). Such foods currently have a niche market, based particularly on natural food and specialty food outlets.

#### Personal care products

In the 1990s, European firms introduced lines of hemp oil-based personal care products, including soaps, shampoos, bubble baths, and perfumes. Of the approximate one billion US dollars in gross sales that is reported annually by The Body Shop, about 4% of sales in 2000 were hemp products.

### Current Status by State

#### New South Wales

Field trials for research purposes have been permitted in NSW since September 1995 under the Drug Misuse and Trafficking Act 1985 that is administered by NSW Health. The allowable upper limit for THC in trial crops is set at 0.3%, and the Act does not allow for commercial production of the crop. Trials have been conducted at a range of sites, and fibre and seed production have been assessed. According to Spurway and Trounce (2003), the overall objective of the trial program is to assess the yield potential of low-THC crops in a range of environments within NSW and, where possible, to have the stem fibre or seed produced by the crop evaluated for paper, textile, food and other products.

NSW Agriculture administers and processes applications for the field trials and supervises trial sites. Applicants meet all costs associated with the trials. About 40 trials have produced an average yield of 5 tonnes dry stems/ hectare, which is not considered to be economically viable (Nowland 2002). However, trials conducted during 2000/01 produced yields of 12 tonnes dry stems/ hectare (Spurway and Trounce 2003). The highest yields occurred in the central west of the state using a centre-pivot overhead sprinkler system. However, most of NSW is deemed to have insufficient summer rain for a dry-land crop to be an option. Ten trials were approved for 2003/04, bringing the total number of trials conducted since 1995 to 68 (pers. comm. Bob Trounce, NSW Agriculture).

Hitherto, only industrial hemp trials have been conducted in NSW, and the committee for approvals generally limits these trials to 5 hectares or less, although some growers make requests for a larger area than this amount. With recent reports of yields of 12 tonnes/ hectare, the committee for approvals is moving closer to seeking changes to the legislation to allow for the commercialisation of the industry. It is believed that despite intense competition from subsidised overseas production, there is some chance of competing on the world stage (pers. comm. Bob Trounce, NSW Agriculture).

Current 2007/08 expressions of interest close 29th June 2007 contact Bev Zurbo DPI Wagga or Michael Hudson NSW Health North Sydney.

#### Queensland

The Drugs Misuse Act 1986 of Queensland defines C. sativa as a dangerous drug. For the purpose of assessing the potential of C. sativa plants with a low THC concentration for commercial fibre production, the Act was amended in early 1998. These amendments allowed for controlled field trials and plant breeding research to be conducted for a period of three years. The trial period was subsequently extended for twelve months by the one extension permitted under section 43Y of the Act. The extended period expired on 18 December 2002.

On 8 August 2002, the Drugs Misuse Amendment Bill was passed by Parliament, which allowed for the commercialisation of industrial hemp fibre and grain. Proclamation of the amendments to both the Drugs Misuse Act 1986 and the Drugs Misuse Regulation 1987 occurred on 27 September 2002.

The legislation now allows for the research, production, processing, marketing, and trade of processed industrial cannabis fibre and seed products in Queensland, with the exception of those products that could be smoked, administered or consumed.

Prior to the amendments to the Act, possession or supply of commercial industrial hemp products that were available in the market place (e.g. hemp shirts, hemp hand cream etc) was technically in breach of the law, despite the fact that the THC concentration may have been minimal or non-existent. The amendments ensured that sections 5 (trafficking in dangerous drugs), 6 (supplying dangerous drugs), 8 (producing dangerous drugs) or 9 (possessing dangerous drugs) of the Act do not apply to a manufactured product. A 'manufactured product' is defined as a product made from, or partly from, processed cannabis with a THC concentration of not more that 0.1% and that is in a form that cannot be inhaled, administered or consumed. This last requirement prevents a person from trying to sell products that mimic illegal products such as 'low hemp' cigarettes.

#### Victoria

Full commercialisation of the industrial hemp industry in Victoria has been possible since 1997, when the Drugs, Poisons and Controlled Substances Act 1981 was amended to allow the production of low-THC cannabis for non-therapeutic use. The Act, administered by Victoria's Minister for Health and the Department of Human Services, allows for the possession, cultivation and selling of industrial hemp by authorised persons who meet strict criteria and undergo a police records check. Three-year-authorisations are issued by the Department of Primary Industries Victoria, and the Secretary of that department must be notified of changes in ownership of management of the business of the person. Authorisations are also subject to various terms, conditions, limitations and restrictions. Significant fees and charges apply.

Most of the permits that have been issued since 1997 were for less than one hectare, although one authorisation was approved for 30 hectares. According to Nowland (2002), the total area of industrial hemp planted in Victoria was less than 100 hectares per year. Various trials have been conducted – for example, field assessments conducted at five sites in 1996/97 showed a weight of

stems (dried in the field) of cultivar Futura 77 of 5.3 to 12 tonnes/ hectare (Spurway and Trounce 2003). Interest in the industrial hemp industry in Victoria has declined significantly in recent years, with only two authorisations current for 2003/04 (pers. comm. Gary Darcy, DPI Victoria).

#### Tasmania

The Tasmanian Hemp Company based in southern Tasmania, was first licensed in 1991/92 to cultivate industrial hemp for commercial research purposes. Australian Hemp Research and Manufacture (AHRM), based in Queensland, commenced trials in Tasmania in the mid-1990's and was later joined by a newly formed group called the Tasmanian Hemp Growers' Cooperative. AHRM has now changed its name to EcoFibre Industries Limited (EIL).
Licenses are granted by the Department of Health and Human Services in cooperation with Tasmania Police and the Department of Justice and Industrial Relations, in accordance with the provisions of the Poisons Act 1971, which is presently under review. There is provision for the licensing of processors, however, no large commercial processing facility exists in Tasmania to date. Cottage industry size manufacturing of specialty stationery products does occur.
Areas sown to industrial hemp between 1997 and 2002 have fluctuated from 2 to 40 hectares. For 2003/04, only 0.2 hectares was sown (pers. comm. Joe Horak, DPIWE Tasmania). Yields in Tasmania have been approximately 5 to 6 tonnes fibre/ hectare or 800 kilograms seed/ hectare (Nowland 2002).

Confidence in the Tasmanian industry has fluctuated dramatically over the years. This fluctuation appears to be dependent upon financial, marketing and regulatory variability, particularly due to recent decisions regarding hemp for food (pers. comm. Joe Horak, DPIWE Tasmania). DPIWE continues to process inquiries regarding the production of industrial hemp, although it is expected that a lack of processing facilities will continue to stymie development of the industry in the short term

#### Western Australia

From 1996/97 until 1999/2000, industrial hemp trials were conducted in Western Australia through exemptions granted under the Poisons Act 1964 and the Misuse of Drugs Act 1981. There have not been any growers of industrial hemp since the Department of Agriculture Western Australia ceased its trials in 1999/2000. Legislation to allow for the development of a commercial industrial hemp industry in Western Australia, the Industrial Hemp Bill 2003, was introduced into the Western Australian Parliament in November 2003 and was passed in early 2004 (pers. comm. Dick Taylor, Department of Agriculture Western Australia).

Under the new laws, licenses to cultivate, harvest or process industrial hemp are issued by a Registrar, appointed for that purpose. Background checks are conducted on all applicants to determine their character and any criminal associations. The licensing conditions determine the location of crops, ensure security measures are put in place to restrict access to seeds and plants, and articulate the conditions for harvesting and processing. The new legislation allows the police and specially appointed inspectors to enter and inspect properties, examine seed, plants or crops and remove them for testing.

#### South Australia

Three trials to assess the growth of industrial hemp were licensed by the South Australian Government in the mid-1990's (Nowland 2002). Irrigation trials conducted in the south east of the State in late spring demonstrated sufficient yield to promise a commercial potential, with subsequent testing required. Attempts to grow industrial hemp as a dryland winter sown crop on Yorke Peninsula and the Lower North failed. Spurway and Trounce (2003) subsequently reported that the trial program has recently been wound down due to low trial yields. While the current legislation in SA is restricted to allowing only research trials, Nowland (2002) reported that the

South Australian Government sees little point in changing the law to make it easier to grow commercial crops until real commercial prospects can be demonstrated.

#### Northern Territory

At the present time, the Northern Territory Government is reported to have no intention of licensing any industrial hemp trials as it sees short day lengths as a major problem during the growing season (Nowland 2002). It was reported that kenaf is considered to be a better option than industrial hemp and a commercial proposition was encouraged from a South East Asian company to grow this rival crop for use in the paper industry. However, due to a lack of interested growers, the Kenaf project is now on hold.

#### Demand Farming Australia©

Demand Farming Australia© (DFA) is a national project that will change the face of agriculture in Australia. DFA is a joint venture between Aurora Practical Solutions, a Dubbo based Research and Business Development company and Elders Ltd, supported by the NSW Department of Primary Industry, NSW Department of State and Regional Development and Local Government.

This project is about changing the balance of agriculture back towards farmers. Participants will have access to commercial opportunities only possible through the collective strength of the Demand Farming Australia© model. The efficient supply chains, information and improved market linkages will give farmers more power in negotiating contract supply arrangements.

Demand Farming Australia© is putting together a collaboration of initially 1000 of the top 30% of farmers in Australia. The participating farmers will be spread across approximately 40 strategic locations in Australia, of which approximately 400 farmers are in New South Wales. This aggregation of farms will be equivalent to a land bank greater than $2 billion, which gives great negotiating power and market leverage.

Demand Farming Australia© will engage farming businesses in a systematic roll-out across Australia, and the best farmers will select themselves as they will be innovative, forward thinking and willing to invest in new opportunities.

Our emphasis is in quality assured, traceable food, fibre and energy crops that meet the specific high standards required for the specialty market, particularly in the ever growing Asian food sector. With the growing need for renewable energy crops for fueling our energy needs, an increasing demand is emerging for renewable crops that are, not only carbon neutral, but also environmentally tolerant in the ever changing agricultural landscape.

Workshops are conducted with interested farming businesses, followed by Farm Audits of the participating farms recording farming practices, production capabilities, soil types, water availability, climate, etc. This data will provide aggregated estimates of potential for a large range of produce, with large volumes, that are of interest to customers who prefer to buy from one quality and traceable source rather than many small suppliers or 'anonymous' pooled product.

A large group of sales staff based overseas will sell to large customers, aggregated volumes of high-quality produce that will command higher prices than mixed quality offerings. There will also be sales to Australian customers but the main opportunities will be in exports.

Significant ongoing investments in market intelligence, consumer research and market opportunity evaluations will provide participating farmers with significantly more opportunities and less risk than trying to undertake research themselves.

Participating farmers will be offered contracts with farm gate prices based on quality parameters, an input/output model, crop check systems and anticipated gross margins and internal rate of return. This will enable farmers to compare current returns per ha and per mg of water against the Demand Farming Australia© offers.

Participating farmers have the choice to decide whether they wish to participate in the offers or not. Increased medium to long term returns, diversification, sustainability and reduction of risk with less market fluctuations are all objectives set down by Demand Farming Australia©.

Currently the aggregation consist of 127 farmers with over 460,000 ha worth in excess of $1 Billion of gross value. Detailed analysis of the production capabilities and interest of these top farming businesses outlines extensive data to model production capabilities and values of many crops including Industrial Hemp. Upwards of 70 different crops can be grown in this aggregation with a number of them showing promise not only gross margin at a farm gate level but potential value adding both regionally and nationally for domestic and international markets.

Out of the 127 farmers and 460,000 hectares greater than 40% of the farmers have shown interest in growing Industrial Hemp as part of there rotation with some farmers seeing the crop if the numbers add up at a farm gate level potentially being the major part of the seasonal income. If a number of farmers in the aggregation are willing to plant upwards of 30,000 hectares of Industrial Hemp it would equate to approximately $50-100 million in farm gate revenue seasonal dependant. Attached in the appendix is a draft irrigated and dryland gross margins outlining the crops potential returns in comparison to other currently cultivated summer crops like cotton, corn and soybean.

Key DFA contacts for this project are John Larkin, Managing Director, and David Ward, National Agronomy Manager.

**Areas of Potential Production for NSW**

Throughout our research we have identified a number of areas where Hemp production would be suitable, the Casino and Northern Rivers regions of northern NSW, the McIntyre Valley, Moree, Narrabri, Gunnedah and Quirindi shires, the Macquarie and Lachlan Valleys and the Riverina and Murrumbidgee Irrigation areas are all areas suited to a number of known varieties under research that have yielded very economic outcomes.

Over this period of time limited results have been collected due to the slow uptake and acceptance of the industry, however due to the work being conducted by a Queensland company and a private operator in Griffith there is a renewed interest in the crops potential especially on the Darling Downs of Queensland. This being the case and with the agronomy knowledge and varietals selection there is detailed relationships, joint venture projects and alliances being made for the expansion of the industry into NSW and across Australia.

**Domestic Interest**

We have been in communications with a number of domestic customers who currently use Industrial Hemp fibre which they import from China in there products of Wool blended garments, new emerging building products and many other uses that are currently under business development and commercialisation with large environmental benefits from insulation characteristics to renewable materials and carbon sequestration factors. We have also had discussions with a number of transport companies regarding the transporting and storage of small to medium sized packaged goods from interstate into the wholesale and retail sector looking at efficiencies created by using Hemp products that are lighter and stronger than current non recyclable materials in use today.

**CSIRO - Crop Biofactories Initiative (CBI)**

CBI is a jointly funded project between CSIRO and the Grains R&D Corporation with a primary aim of utilising GM technology for expression of novel industrial compounds in field crops. The program is in year-3 of a projected 12 year term and builds on the strong biotechnology capabilities of CSIRO in areas of gene discovery and transformation technology, enzymology, microbiology, fermentation and biocatalysis. A range of exploratory projects show particular promise to move from the discovery/technical development phase to potential commercialisation: Novel protein biopolymers and Vernonia oil have been recognised as functional coatings, plasticiser and polymer applications, but commercial development has been limited by low-yielding indigenous plant sources. The CBI project has completed initial genetic transformation and expression and is now moving to optimise high vernolic oil expression in an agronomically productive oilseed crop. During discussions with the CSIRO project managers we discussed our current research projects in Industrial Hemp to name a few which concluded by them advising us that a number of the species in the Hemp family have potential proteins conducive to there work and a joint research projects and information transfer maybe possible.

**International Interest**

During a recent trip to Europe we identified a number of possible markets particularly into the high end European car market. As Australia has a counter cyclical season to that of Europe we have the ability to produce Industrial Hemp fibre at a time of the year when it is to wet and cold for production in the northern hemisphere. We have conducted detailed discussions and potential joint venture projects with a number of companies who have been to Australia on many occasions to attempt to grow and manufacture Industrial Hemp but as the Australian farming landscape is unfamiliar to them and the legislative difference between states provides difficulty in establishing an effective supply chain. Euro-Fibre, a large manufacturing company contract farmers in Hungary and other European countries to grow high quality Industrial Hemp fibre for pelleting and blending with PEP (Polypropylene) for blow molding for such products as dash boards and car infill panels for BMW and Mercedes in Germany. With expressions of interest from this particular customer of 20-30,000 tonnes per annum initially and an increasing market of some 10-20% per year, we see this market offering opportunity to our farmers for supplying a traceable quality assure product onto the international stage.

**Regional Value Adding**

We are in discussions and negotiations with a Queensland engineering company based around regional manufacturing model that would allow for processing for a number of products previously mentioned. These plants have the ability to create value adding opportunities in regional areas close to the production areas with the ability to create jobs and regional wealth within the Local Government Areas (LGA) where the crop is being grown.

**Quality Assurance and Traceability**

Demand Farming Australia's emphasis is in quality assured, traceable food, fibre and energy crops that meet the specific high standards required for the specialty market, particularly in the ever growing Asian food sector. With the growing need for renewable energy crops for fueling our energy needs, an increasing demand is emerging for renewable crops that are, not only carbon neutral, but also environmentally tolerant in the ever changing agricultural landscape. Traceability and Quality assurance pays premiums in many market sectors across the world and with the push on environmentally friendly crops and not only give benefits to the wider environment but allow the basic consumer to purchase products be they food or fibre crops and have the ability to make detailed educated choice on where, when and from whom they purchase allow for greater choice and market differentiation by consumers.

**Carbon Sequestration**

Carbon Sequestration relies on the natural process of photosynthesis, which uses carbon dioxide from the atmosphere together with sunlight in a chemical reaction to produce oxygen and glucose. The carbon dioxide from the atmosphere used in photosynthesis is effectively captured in the structure of the plants.

Since the advent of climate change due to an increase in carbon dioxide in the atmosphere, carbon sequestration had been recognised as a natural process that can be used to reduce the amount of carbon dioxide existing in the atmosphere. The Greenhouse Gas Reduction Scheme (GGAS) Carbon Sequestration Rule provides the opportunity for primary production to potentially create abatement certificates for sequestering carbon.

Attached are the rules in applying for carbon sequestration which outlines the guidelines that all green plants can be used in the sequestering of carbon for exchange and such.

**An outline of legislative requirements in Queensland**

The following is an outline of the legislative requirements currently held in Queensland, we have attached this as a guide to the potential guidelines for NSW. The amendments to the Drugs Misuse Act 1986 are underpinned by the requirement to hold either a researcher license and/ or a grower license or to be an authorised person. Only licensed or authorised persons are able to deal with C. sativa without committing an offence under the Act in relation to trafficking in, supplying, producing, publishing or possessing instructions for producing and possessing C. sativa. The licensing system differentiates between legal and illegal use of C. sativa. Exemptions from offences under the Act only operate while licensees perform activities in accordance with the Act and the conditions of the licenses.

Industrial hemp inspectors are appointed under the Act (division 11) to monitor the compliance of licensees with their license. Inspectors have wide powers of entry (with or without consent) and general powers.

There are three categories of licenses, each one permitting the use of C. sativa with different concentrations of THC, as follows:

- A category 1 researcher license, among other things, enables a person to possess for research purposes industrial cannabis plants and seeds and class A and class B research cannabis plants and seed. A 'class A research cannabis plant' has been defined to mean a cannabis plant that has a THC concentration in its leaves and flowering heads of 3% or more. Class A research cannabis seed' has been defined to mean seed harvested from a Class A research cannabis plant or seed that, if grown, will produce a class A research cannabis plant. A 'class B research cannabis plant' has been defined to mean a cannabis plant with a THC concentration in its leaves and flowering heads of more than 1% but less than 3%. Class B research cannabis seed' has been defined to mean seed harvested from a class B research cannabis plant or seed that, if grown, will produce a class B research cannabis plant. A category 1 researcher license enables the holder to source new strains of C. sativa plants from the wild into their plant breeding programs. Strict security provisions apply to this category of license, and plant breeders need to demonstrate appropriate educational or other qualifications and experience to participate in this activity.

- A category 2 researcher license, among other things, enables a person to possess for research purposes industrial cannabis plants and seed and Class B research cannabis plants and seed. Plant breeders need to demonstrate appropriate educational or other qualifications and experience to participate in this activity.

- A grower license, among other things, enables a person to possess industrial cannabis plants and seed and to produce industrial cannabis plants from certified cannabis seed. An 'industrial cannabis plant' has been defined to mean a cannabis plant with a THC concentration in its leaves and flowering heads of not more than 1%. Industrial cannabis seed has been defined to mean cannabis seed harvested from an industrial cannabis plant or certified cannabis seed. Certified cannabis seed' has been defined to mean seed certified, in the way prescribed under a regulation that will produce cannabis plants with a THC concentration in their leaves and flowering heads of not more than 0.5%. However, licensed growers are authorised to possess industrial cannabis plants and seed with a THC concentration of up to 1% to allow for circumstances in which elevated THC concentrations that may result from climatic or environmental changes. Without some tolerance levels growers would be exposed to criminal prosecution.

**Eligibility to hold a license**

To be eligible to hold a grower license, an applicant (if a corporation, its executive officers), must not have been convicted of a serious offence in the preceding 10 years and not be affected by bankruptcy action. To be eligible to hold a researcher (category 1 or 2) license, an applicant (if a corporation, its executive officers) must not have been convicted of a serious offence in the preceding 10 years and have the necessary educational or other qualifications and experience to engage in plant breeding or other research. For a corporation applying for a researcher license, a person employed by the corporation to carry out plant breeding under the license who is not an executive officer meets this criterion. A serious offence is defined in the legislation. The Chief Executive of DPI&F also has the power to determine the suitability of an applicant having regard to their character, honesty and integrity and the character of their close associates (close associate is defined in the legislation), their criminal history and whether they are capable of satisfactorily performing the activities of a licensee. Applicants for a license are required to undergo a criminal history check by the Queensland Police Service.

**Provision for authorised persons**

In addition to the licensing requirements of growers and researchers, the Drugs Misuse Act 1986 protects from drug trafficking certain other persons (authorised persons) who need to possess, supply or transport industrial hemp, ancillary to licensed growers and researchers. Authorised persons include denaturers, seed suppliers, analysts, carriers, inspectors, manufacturers and family members and employees of licensed holders. Certain conditions are attached to these persons and these conditions are outlined in the Drugs Misuse Regulation 1987. The conditions imposed on authorised persons are less stringent than those imposed on license holders because of the lower risks involved.

**Costs associated with licenses, inspection, and monitoring**

As set by regulation, an application fee must accompany an application for a license. Applicants are also required to pay the cost of criminal history checks for themselves as well as their close associates. For corporations, criminal history checks are required for each executive officer. A fee to enable the Queensland Police Service (QPS) to conduct these criminal history checks is also required. However license applicants send their criminal history check fees with their license application fee direct to DPI&F and not QPS. After three years, a licensee has the option of renewing their license for a further three-year period. A renewal fee will apply. For details of the license application fee, license renewal fee or the fees for criminal history checks that are currently in force please contact the DPI&F Business Information Centre.

Participation in the industrial hemp industry is based on a user-pays principle. The legislation requires the license-holder to pay the reasonable costs of compliance monitoring activities performed under the license, including inspection and plant sampling fees and any laboratory

analysis necessary to determine the concentration of THC in the leaves and flowering heads of cannabis plants in the possession of the license holder. License-holders should expect to have their crops analyzed for THC concentration. Where more than one variety of industrial hemp is grown, each variety is analyzed for THC concentration. The cost of inspections is based on the time taken to conduct the inspection, as well as the traveling time of the inspector. It would therefore be prudent for growers to make provision for an amount of $1,000 as a minimum in their annual commercial hemp production budgets to cover these inspection and analytical costs. Where repeat inspections are necessary due to non-compliant behavior, the licensee is required to pay the full cost of these additional checks. (The Drugs Misuse Act 1986 and the Drugs Misuse Regulation 1987 is attached)

**Strategy**

The current strategy for Industrial Hemp production lies with several factors needing to be completed so as to move forward with the areas of potential production outlined in the above report. John Larkin is to travel to Europe to obtain supply chain agreements for the pellet Industrial Hemp for the automobile market, production specifications needed by the customers and relevant agronomy details. We have calculated some approximate farm gate prices which are illustrated in the appendices titled Hemp Gross Margin and are showing good returns both irrigated and dry land when comparing them to other summer crops such as cotton and grain sorghum. As mentioned there is a high demand for hemp fibres in many industries in Europe and Asia especially the automobile industry due to the EU strategy of industry having recycled or renewable/carbon neural products within the manufacturing line.

Our knowledge to date outlines that currently Tasmania has taken there production line along the food chain markets as there climate is more suited to theses types of varieties and intensity needed for production. As for NSW and the northern sectors of Australia the production of the longer fibre crops for manufacturing are more in line with our production expectations and the agronomic details at hand.

Once we have identified the market specifications from the customers and understanding the technology and the logistics of the product we can continue our research into the agronomy and the logistics for the production and future manufacturing of the Hemp fibre production in NSW. In addition to this we have had preliminary meetings with the state government regarding the potential changes to the current legislation for Industrial Hemp production and need to have a full supply chain and production methods set out for ease of transition into the new market potential of Industrial Hemp. The Queensland legislation took several years of negotiation however the production parameters needed for NSW would not differ significantly so a large degree of the wording and compliances has been completed.

**Recommendation**

Current the statutory approval mechanism for hemp cultivation under section 23 of the Drug Misuse and Trafficking Act 1985 (DMTA) is currently with the Director-General of the Department of Health. It has been highlighted during communications with NSW Health that the matter of changes is firmly in the court of the NSW DPI and that being so NSW DPI as coordinating agency has the authority and just cause to immediately organize for legislation amendments to the Drug Misues & Trafficking Act 1985 allowing for the commercialisation of Industrial Hemp in NSW. It is also requested that the amended legislation be tabled at NSW State Parliament as soon as possible.

**Priority Status**
High

**Refences**

- QLD DPI Information paper on industrial hemp (industrial cannabis), 23 February 2007, Version 7
- RIRDC Research Reports – 97/31 and 97/51
- Beverly Zurbo, NSW DPI Wagga Institute
- QLD DPI Ag Notes
- Guide to applying – Carbon Sequestration Rule

**Appendices**
- Letters of Support
- Gross Margins

Yours Sincerely

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**Irrigated Crop Gross Margins**

| | Cotton | Maize | Soybean | Sunflower | Sorghum | Hemp Fibre Full Irrig | Hemp Fibre Partial Irrig |
|---|---|---|---|---|---|---|---|
| **Gross income** | | | | | | | |
| Price($/t)* (Farm Gate) | $ 500.00 | $ 180.00 | $ 360.00 | $ 410.00 | $ 150.00 | $ 245.00 | $ 245.00 |
| Yield (t/ha)** | 8.50 | 10.00 | 3.00 | 3.00 | 8.00 | 12.00 | 8.00 |
| **Gross Income ($/ha)** | $ 4,250.00 | $ 1,800.00 | $ 1,080.00 | $ 1,230.00 | $ 1,200.00 | $ 2,940.00 | $ 1,960.00 |
| **Variable costs** | | | | | | | |
| Cultivation | $ 150.00 | $ 50.00 | $ 25.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 |
| Fallow spraying | $ 50.00 | $ 50.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 | $ 25.00 |
| Sowing | $ 100.00 | $ 200.00 | $ 100.00 | $ 50.00 | $ 80.00 | $ 250.00 | $ 250.00 |
| Agronomy | $ 45.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 |
| Fertiliser and Application | $ 230.00 | $ 250.00 | $ 40.00 | $ 140.00 | $ 200.00 | $ 250.00 | $ 200.00 |
| Herbicide and Application | $ 120.00 | $ 50.00 | $ 25.00 | $ 30.00 | $ 50.00 | $ 30.00 | $ 30.00 |
| Insecticide and Application | $ 440.00 | $ 15.00 | $ 30.00 | $ 30.00 | $ 30.00 | | |
| Irrigation @ $40/meg | $ 280.00 | $ 280.00 | $ 200.00 | $ 140.00 | $ 160.00 | $ 240.00 | $ 120.00 |
| Insurance | | | | | | | |
| Defoliation | $ 90.00 | | | | $ 25.00 | $ 25.00 | $ 25.00 |
| Harvesting | $ 440.00 | $ 150.00 | $ 100.00 | $ 50.00 | $ 120.00 | $ 120.00 | $ 80.00 |
| Transport &/or Storage | $ 50.00 | | | | | $ 25.00 | $ 25.00 |
| Levies | $ 36.13 | $ 12.60 | $ 10.80 | $ 12.30 | $ 12.00 | | |
| Aggregation Fee (4% onfarm value) | $ 20.00 | $ 7.20 | $ 14.40 | $ 16.40 | $ 6.00 | $ 9.80 | $ 9.80 |
| Marketing Fee (3% of onfarm value) | $ 15.00 | $ 5.40 | $ 10.80 | $ 12.30 | $ 4.50 | $ 7.35 | $ 7.35 |
| **Total variable costs** | **$ 2,066.13** | **$ 1,075.20** | **$ 586.00** | **$ 561.00** | **$ 767.50** | $ 1,037.15 | $ 827.15 |
| **Gross margin ($/ha)** | $ 2,183.88 | $ 724.80 | $ 494.00 | $ 669.00 | $ 432.50 | $ 1,902.85 | $ 1,132.85 |
| **Megalitre of irrigation** | 7.00 | 7.00 | 5.00 | 3.50 | 4.00 | 7.00 | 3.00 |
| **Gross margin ($/ML)** | $ 311.98 | $ 103.54 | $ 98.80 | $ 191.14 | $ 108.13 | $ 271.84 | $ 377.62 |
| **Other considerations** | | | | | | | |
| Production risk | low | low | med | med | low | low | low |
| Price fluctuations | low | med | high | high | med | -- | -- |
| Cash cost of growing | high | med | low | low | med | low | low |
| Capital investment | high | med | low | low | low | low | low |
| Harvest timeliness | high | low | high | high | med | low | low |
| Management skills | high | med | med | med | med | med | med |
| Irrigation required | high | high | low | low | med | med | med |

* $/bale of cotton - incl. cottonseed value ** bales/ha for cotton ( ) values in brackets are losses


**Dry-land Crop Gross Margins**

| | Cotton Double skip | Maize | Soybeans | Sunflower | Sorghum | Hemp Fibre |
|---|---|---|---|---|---|---|
| **Gross income** | | | | | | |
| Price($/t)* | $ 500.00 | $ 180.00 | $ 360.00 | $ 420.00 | $ 150.00 | **$ 245.00** |
| Yield (t/ha)** | 3.25 | 4.00 | 1.50 | 1.60 | 4.50 | **5.00** |
| **Gross Income ($/ha)** | $ 1,625.00 | $ 720.00 | $ 540.00 | $ 672.00 | $ 675.00 | **$ 1,225.00** |
| **Variable costs** | | | | | | |
| Fallow spraying | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | $ 50.00 | **$ 50.00** |
| Sowing | $ 50.00 | $ 120.00 | $ 40.00 | $ 50.00 | $ 30.00 | **$ 150.00** |
| Agronomy | $ 25.00 | $ 5.00 | $ 5.00 | $ 5.00 | $ 5.00 | **$ 5.00** |
| Fertiliser and Application | $ 50.00 | $ 140.00 | $ 40.00 | $ 100.00 | $ 100.00 | **$ 100.00** |
| Herbicide and Application | $ 150.00 | $ 90.00 | $ 100.00 | $ 100.00 | $ 100.00 | **$ 30.00** |
| Insecticide and Application | $ 125.00 | $ 25.00 | $ 50.00 | $ 25.00 | $ 25.00 | |
| Insurance | | | | | | |
| Defoliation | $ 30.00 | | | | $ 30.00 | **$ 30.00** |
| Harvesting | $ 220.00 | $ 75.00 | $ 75.00 | $ 50.00 | $ 75.00 | **$ 50.00** |
| Transport &/or Storage | $ 30.00 | | | | | **$ 25.00** |
| Levies | $ 13.81 | $ 5.04 | $ 5.40 | $ 6.72 | $ 6.75 | |
| Aggregation Fee (4% onfarm value) | $ 20.00 | $ 7.20 | $ 14.40 | $ 16.80 | $ 6.00 | $ 9.80 |
| Marketing Fee (3% of onfarm value) | $ 15.00 | $ 5.40 | $ 10.80 | $ 12.60 | $ 4.50 | $ 7.35 |
| **Total variable costs** | **$ 778.81** | **$ 522.64** | **$ 390.60** | **$ 416.12** | **$ 432.25** | **$ 457.15** |
| **Gross margin ($/ha)** | **$ 846.19** | **$ 197.36** | **$ 149.40** | **$ 255.88** | **$ 242.75** | **$ 767.85** |
| **Other considerations** | | | | | | |
| Production risk | low | low | low | low | low | **low** |
| Price fluctuations | low | med | med | med | med | **--** |
| Cash cost of growing | high | med | med | med | med | **low** |
| Capital investment | high | med | med | med | low | **low** |
| Harvest timeliness | high | low | low | low | med | **low** |
| Management skills | high | med | med | med | med | **med** |
| Irrigation required | high | high | high | high | med | **med** |

* $/bale of cotton - incl. cottonseed value ** bales/ha for cotton ( ) values in brackets are losses