South African
Hemp Feasibility Report

Commissioned by
Interim Task Team on Bast Crops
South African Plant Fibre Cluster

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TABLE OF CONTENTS

CURRENT HEMP RESEARCH AND DEVELOPMENT

- **International Hemp Research and Development**
  - **Europe**
  - **Australia**
  - **Canada**
  - **China**
  - **Finland**
  - **France**
  - **Germany**
  - **Ireland**
  - **Jamaica**
  - **Lesotho**
  - **South Africa**
  - **New Zealand**
  - **Ukraine**
  - **U.K.**
  - **USA**
  - **Former Yugoslavia**

CONTACTS FOR MORE INFORMATION

- **Hemp Industry Trade Journals and Magazines**
- **International Hemp Organizations**
- **National Hemp Organizations**
- **Conferences and Trade Expositions**
  - **Austria**
  - **Belgium**
  - **Canada**
  - **France**
  - **Germany**
  - **Netherlands**
  - **Poland**
  - **U.K.**
  - **USA**

ECONOMIC MERIT OF PRODUCING HEMP

ROLE-PLAYERS IN HEMP RESEARCH & DEVELOPMENT

HEMP PRODUCTS AND MARKETS

Definition of Hemp

Hemp is a name given to cultivars of the cannabis plant (*Cannabis sativa*) that have been selected over many generations for fibre and seed production. Most hemp cultivars contain less than 1.5% THC, a narcotic compound that has the potential for abuse in high concentrations. Cannabis sativa cultivars selected and developed for their drug properties, referred to as marijuana, or dagga, can have a THC content of 3%-12%. Hemp is a bast fibre, producing its fibres in the stalk similar to flax, kenaf, and sun hemp.

Multiple Uses

Hemp fibre and seed are used to produce a wide range of commodities including food and beverage products, fibreboard, insulation, paper, composites, textiles, carpets, animal bedding and feed, cosmetics, body-care products, soaps, paints, fuels, and medicines.

Hemp Seed Food and Beverage Products

- Hemp seed contains about 25% protein, 30% carbohydrates, & 15% insoluble fibre.[i]
- Hemp seed is reported to contain more easily digestible protein than soybeans.
- Hemp seed contains all 8 amino acids essential to human nutrition.[ii]
- Hemp seed is high in calcium, magnesium, phosphorus, potassium, carotene, sulfur, iron and zinc, as well as Vitamins A, E, C, B1, B2, B3, and B6.[iii]
- Hemp seed imported into the United States or Canada must be steam sterilized at between 180 degrees F.[iv] and 212 degrees F. for 15 minutes to prevent sprouting. Many US facilities receive imported viable seed under customs bond, steam it, and then release it to the consignee or customer with a Certificate of Sterilization.[v]
- Hemp food and beverage products include hemp oil and seed, flour, pasta, cheese, tofu, salad dressings, snacks, sweets, hemp protein powders, soft drinks, beer, and wine. Hemp beer can be made from the seed, flowers, sprouts, and seed cake that is a by-product of oil pressing. Hemp beer is produced and sold in Europe and the US.[vi]

Hemp Oil

- Hemp seed is 25% to 35% oil,[vii] and is one of the oils lowest in saturated fats (8%).[viii]
- Hemp seed oil is the richest source of polyunsaturated essential fatty acids (80%).[ix]
- Hemp seed oil is the only common edible seed oil containing Omega-6 Gamma-Linolenic Acid.[x]
- Hemp seed oil is very fragile and not suitable for cooking.
- Pressed hemp seed oil must be bottled immediately under oxygen-free conditions, and must be refrigerated in dark, airtight containers.[xi]

Fibreboard

- Hemp fibreboard tested by Washington State University Wood Materials and Engineering Laboratory proved to be two and one half times stronger than wood MDF composites, and the hemp composite boards were three times more elastic.
- Hemp hurds can be used in existing mills without major changes in equipment.[xii]

- Russia, Poland and other Eastern European countries already manufacture composite boards from hemp and other plant materials.

Pulp and Paper

- The major use of hemp fibre in Europe is in the production of specialty papers such as cigarette paper, archival paper, tea bags, and currency paper.[xiii]
- The average bast fibre pulp and paper mill produces 5,000 tons of paper per year.
- Most mills process long bast fibre strands, which arrive as bales of cleaned ribbon from pre-processing plants located near the cultivation areas.[xiv]

Composites

- Until the 1930s, hemp-based cellophane, celluloid and other products were common, and Henry Ford used hemp to make car doors and fenders. Today hemp hurds can be used to make new plastic and injection-molded products or blended into recycled plastic products.[xv] Hemp fibres are introduced into plastics to make them stiffer, stronger and more impact resistant. Hemp plastics can be designed that are hard, dense, and heat resistant, and which can be drilled, ground, milled, and planed.
- Hemp plastic products currently made include chairs, boxes, percussion instruments, lampshades, bowls, cups, spectacles, jewelry,[xvi] skateboards, and snowboards.[xvii]

Hemp Animal Bedding

- Hemp horse bedding and cat litter are produced and sold in Europe.[xviii]

Hemp Animal Feeds

- After oil is extracted from the hemp seed, the remaining seed cake is about 25% protein and makes an excellent feed for chicken, cattle,[xix] and fish.[xx]
- Chickens fed hemp seed on a regular basis have been found to produce more eggs, without the added hormones used in most poultry plants.[xxi]

Fuels

- Hemp seed oil can be combined with 15% methanol to create a substitute for diesel fuel which burns 70% cleaner than petroleum diesel.[xxii]
- Hemp stalks are rich in fibre and cellulose, making them conducive for conversion into ethanol and methanol fuels that have a higher octane than gasoline and produce less carbon monoxide. These biomass fuels are also free from sulfur, and do not require the addition of lead and benzene used to boost octane and improve engine performance in fossil fuels.[xxiii] Ethanol holds condensation, eliminating oxidation and corrosion, and is reported to reduce carbon dioxide emissions by more than 30%.[xxiv]
- Hemp is currently being studied in Ireland as a biomass fuel to generate electricity.[xxv]
- Hemp has been reported to yield 1000 gallons of methanol per acre year.
- Hemp stalk can be converted to a charcoal-like fuel through a thermochemical process called pyrolysis. Henry Ford operated a biomass pyrolitic plant at Iron Mountain, Michigan in the mid-20th century.[xxvi]
- An updated information packet on hemp bio-diesel fuel is available for $5.00.[xxvii]

Paints and Varnishes

- Until the 1930's, most paints were made from hemp seed oil and flax seed oil.[xxviii]
- Hemp oil makes a durable, long lasting paint that renders wood water-resistant.[xxix]

Binders

- Hemp hurds have the potential to make glues for composite construction products that are non-toxic and superior to binders currently used. With this technology, industry can produce composite products where all components are derived from hemp.[xxx]

Production Volumes

At least 26 countries permit commercial cultivation of hemp.[xxxi] World production volume was reported to be 124,000 tons in 1992 with China, India, Korea, Romania, and Russia as the major producers.[xxxii] Chinese exports of hemp in 1995 totaled about 50,000 tons.[xxxiii] Total acreage of hemp grown in Europe increased five times from 1989 to 1996, and was projected to increase a further 20,000 ha in 1997.[xxxiv] About 95% of the bast fibre produced in the EU is processed to specialty pulp. The estimated volume of world production of hemp-fibre pulp is about 120,000 tons per year.[xxxv] Spain purchased 90% of the 1996 German hemp crop for pulp production.[xxxvi] German farmers grew 2,812 hectares in 1997.

Yield Statistics

There is much information on yields of hemp stalk and seed from international studies. Dry stem yields of 16.6 t/ha[xxxvii] and 2.6 t/ha total fibre have been recorded.[xxxviii] There is only one hemp cultivar specifically grown for high yield seed production, and yields from this cultivar are from 1-1.5 tons/ha. A hemp study in Illinois reported an estimated seed yield of 4 tons/ acre.[xxxix] Additional high yielding hemp seed cultivars need to be developed. Drug cultivars of cannabis developed for high flower yield have produced more than a kilogram of seed per plant, making a yield of several tons per hectare conceivable.[xl]

Markets for Raw Hemp Products

International markets for raw hemp products include certified agricultural seed, as well as edible seed, and stalk. French hemp seed for sowing sold domestically for 1600 FF/100 kilos, and 2000 FF/100 kg. to countries abroad in 1992. Certified agricultural seed in 1994 ranged in price from USD 1,000-1,300 per ton, plus shipping from Ukraine,[xli] and $2,000-$2,100 per ton, plus shipping, from Hungary,[xlii] to F16.3000 - F21.000 per ton for seed, plus shipping, from France,[xliii] to $8.00/kg. from a wholesale supplier in The Netherlands in 1995.[xliv] French prices for hemp straw (at 16%) humidity were about 555 FF per tonne in 1992. Gross returns for hemp in 1994 per hectare in Canada was estimated to be $420-$1125 for raw stalk and $148-423 for seed.[xlv] A supplier in Ukraine in 1994 reported a price of USD 350-$400 for edible seed.[xlvi] German farmers, assisted by the EU subsidy for hemp, can earn a gross profit of 1,400-1,500 DM/ha; comparable to gross profits for winter wheat, barley and maize.[xlvii] French hemp seed for eating sold for 250FF for 100kg. in 1992. A July 1998 study by the University of Kentucky in the US predicted that local hemp farmers could expect to clear $200 to $600 an acre; less than the profit per acre for tobacco, but more than maize, hay, soybeans and wheat.[xlviii] Organically grown hemp seed currently sell for Canadian $525-$1,750/acre in Europe.[xlix]

Markets for Farm Processed Hemp Products

Farm processed hemp products include farm processed,[l] and decorticated stalk, chopped stalk either baled or ensilaged, and farm pressed oil. French prices for one ton of hemp bark was 2,100 FF in July 1992, one ton of woody core was worth 250 FF. Gross returns for hemp in 1994 per hectare in Canada were estimated to be $693-$2288 for raw fibre, and $420-$900 for the hurds.[li] A supplier in Ukraine in 1994 reported a price of USD $1,100-$1,400 for long fibre, and $350-$400 per ton for short fibre.[lii] Statistics from a 1994 US hemp feasibility study suggest that Colorado farmers could realize a profit of $660 per acre for fibre and $125 per acre for hurds. Mechanically processed hemp fibres in Germany are currently offered at prices ranging from 0.70- 2.00 DM/kg, (lower than the price for comparable flax fibres). Production of fine fibres for textiles and thermal insulation requires physical-chemical processing, resulting in a fibre price of typically 3DM/kg; cost competitive with cotton.[liii] Expected profitability of hemp for Canadian farmers in 1997 was reported to be $100 per acre, with a high of $193. Other current profit estimates for Canadian farmers are CN$235 to $437 an acre for those with contracts for fibre. Farmers with grain and fibre contracts receive CN$200 a ton for their fibre, or CN$75 less than those who grow for fibre alone, but they are expected to gross CN$950 per acre for grain and fibre and net CN$420.50 per acre. Kenex, a Canadian agricultural merchant promises to pay growers CN$275 a ton "for baled hemp delivered at 15 per cent moisture or less." [liv] Growers of grain and fibre can expect to get 25 bushels per acre of grain at 44 pounds per bushel.[lv] Kenex will pay CN$0.50 cents a pound for clean grain at 10 percent moisture, and will pay drying costs this year.[lvi] According to Industrial Ag. Innovations, the 1998 price for hemp fibre in quantities exceeding 10 tons, excluding shipping, is USD $0.50/lb. for 90% pure uncombed fibre; $0.55/lb. for 95% pure uncombed fibre; and $0.96/lb. for medium quality hemp sliver.[lvii] Seed pressed for oil can gross C$2,900-$4,800 per acre based on an oil extraction rate of 25% and seed yields of 0.3 and 0.5t/ac.[lviii]

International Wholesale and Retail Markets for Hemp Products

Wholesale and retail prices for hemp can be obtained from web-listings, catalogs from wholesale and retail suppliers, and from local hemp shops. Worldwide hemp sales in 1993 were estimated at USD$5 million, in 1995 they totalled $75 million, and are expected to reach $1.5 billion by 2001, according to Hemptech, a California consulting firm that tracks the industry, annual sales.[lix] There is an opportunity for considerable growth in the market for hemp products in the US.[lx] The number of companies which import, manufacture, or sell hemp products in the US grew from four in 1991 to over one thousand in 1996, with an estimated revenue of $22 million in 1996.[lxi] The U.S. imported $5 million in raw hemp and $25 million in finished hemp products in 1996. US hemp imports are growing at more than 50% a year.[lxii] A recent story in the Wall Street Journal reported that the demand for hemp worldwide will increase from $75 million in 1997 to $250 million in 1999 more than tripling in demand. The worldwide demand for industrial hemp has increased 233 percent in just two years.[lxiii] The estimated market potential in Germany for intermediate hemp products such as fibre, hurd, seed, and oil, has been estimated at DM120-140 million.[lxiv]

Wholesale Prices for Hemp Products

1994 wholesale prices for 100% hemp paper from Steba Ltd. in Hungary:[lxv]

70gram/m2 paper in A4size 500 sheets	17.20 DEM per pack for orders above 10 tons
70gram/m2 paper in A3size 500 sheets	34.40 DEM per pack for orders above 10 tons
80gram/m2 paper in A4size 500 sheets	18.90 DEM per pack for orders above 10 tons

80gram/m2 paper in A3size 500 sheets 37.80 DEM per pack for orders above 10 tons
115gram/m2 paper in A4size 500 sheets 21.00 DEM per pack for orders above 10 tons
115gram/m2 paper in A3size 500 sheets 42.00 DEM per pack for orders above 10 tons
200gram/m2 paper in A4size 100 sheets 9.10 DEM per pack for orders above 10 tons
200gram/m2 paper in A3size 100 sheets 18.20 DEM per pack for orders above 10 tons
240gram/m2 paper in A4size 100 sheets 10.00 DEM per pack for orders above 10 tons
240gram/m2 paper in A3size 100 sheets 20.00 DEM per pack for orders above 10 tons

1994 wholesale prices for hemp fabric from Steba Ltd. Hungary:
100% hemp fabric, 270 g/m2, natural color, not bleached 20.80 DEM/meter
100% hemp fabric, 400 g/m2, natural color, not bleached 20.10 DEM/meter
100% hemp fabric, 400 g/m2, white, bleached 20.80 DEM/meter
80% hemp, 20% flax 520 g/m2, natural color 17.20 DEM/meter
80% hemp, 20% flax 580 g/m2, natural color, herringbone weave 17.70 DEM/meter

1994 wholesale prices for hemp fabric from Naturetex International. The Netherlands: [lxvi]
100% hemp summer cloth, 271g./m2, 147cm. wide $6.28 USD FOB Qingdao, China
100% hemp denim, 373g./m2, 150cm. wide $8.68 USD FOB Qingdao, China
100% hemp canvas, 407g./m2, 150cm. wide $8.68 USD FOB Qingdao, China
60% hemp 40% silk fabric, 88g./m2, 112cm. wide $5.90 USD FOB Qingdao, China
55% hemp 45% cotton denim, 356g./m2, 150cm. wide $4.60 USD FOB Qingdao, China

1995 wholesale prices for hemp fabric from Naturetex International. The Netherlands:
100% hemp summer cloth, 271g./m2, 147cm. wide $6.84 USD FOB Qingdao, China
100% hemp denim, 407g./m2, 150cm. wide $9.46 USD FOB Qingdao, China
100% hemp canvas, 407g./m2, 150cm. wide $9.46 USD FOB Qingdao, China
60% hemp 40% silk fabric, 88g./m2, 112cm. wide $6.16 USD FOB Qingdao, China
55% hemp 45% cotton denim, 356g./m2, 150cm. wide $4.81 USD FOB Qingdao, China

1995 wholesale prices for hemp fabric from Hemp Textiles International. USA:[lxvii]
100% hemp linen 109 yard roll $7.83 per yard (10.88 oz/yard2) for 10,000+ yards
100% hemp canvas 109 yard roll $7.66/yd. (14.14 oz/yard2) for 10,000+ yards
100% hemp denim 109 yard roll $9.24/yd. (10.88 oz/yard2) for 10,000+ yards
55% hemp/cotton denim 16 yard roll $3.94/yd (10.10oz/yard2) for 10,000+yards

1996 wholesale prices for hemp fabric from ReSource Trim & Notions. USA:[lxviii]
100% hemp summer-cloth, 8oz., 59" wide, $7.68 USD LDP Los Angeles CA.
100% hemp denim 10oz., 59" wide, $12.05 USD LDP Los Angeles CA.
100% hemp canvas 12oz., 60" wide, $9.81 USD LDP Los Angeles CA.
100% hemp herringbone 12oz., 59" wide, $11.76 USD LDP Los Angeles CA
55% hemp/45% cotton twill, 11.1oz., 59" wide, $5.73 USD LDP Los Angeles CA

1998 wholesale prices for hemp fabric from Baiyun Corporation. China: [lxix]

100% hemp summer cloth	8.5NMX8.5NMX32X30X44"	$3.00/m
100% hemp summer cloth	18NMX18NMX40X40X56"	$5.10/m
100% hemp summer cloth	18NMX18NMX50X44X44"	$4.00/m

100% hemp denim (blue)	16NM/2X16NM/2X51X32X60"	$7.90/m
100% hemp100% canvas	16NM/2X7NMX41X27X44"	$4.10/m
100% hemp100% twill	16NM/2X8.5NMX51X32X44"	$4.60 /m
100% hemp	10NM/2X10NM/2X37X24.5X60"	$10.20/m
55% hemp/45% cotton	7SX7SX41X35X150CM	$2.40/m
55% hemp/45% cotton	11S/2X11SX29X22X150CM	$2.00/m
55% hemp/45% cotton	11SX11SX52X45X150CM	$2.20/m
55% hemp/45% cotton denim, blue	11S/2X7SX59X34X150CM	$3.38/m
100% hemp twill	10NM/2X10NM/2X36X24X150CM	$6.30/m
100% hemp canvas	10NM/2X5NMX36X19X150CM	$6.00/m
100% hemp canvas	10NM/2X5NMX34X20X150CM	$6.60/m
100% hemp canvas	16NM/2X5NMX40X21X150CM	$6.00/m
100% hemp canvas	16NM/2X7NMX41X29X150CM	$7.50/m
100% hemp canvas	16NM/2X7NMX41X29X150CM	$6.65/m

1998 wholesale prices for hemp yarn from Baiyun Corporation. China:

6nm pure hemp yarn (long fiber)	$5,575.00/ton (FOB China)
7nm pure hemp yarn (long fiber)	$5,938.00/ton (FOB China)
8.5nm pure hemp yarn (long fiber)	$5,975.00/ton (FOB China)
10.5nm pure hemp yarn (long fiber)	$6,125.00/ton (FOB China)
16nm pure hemp yarn (long fiber)	$6,750.00/ton (FOB China)
18nm pure hemp yarn (long fiber)	$7,000.00/ton (FOB China)
8.5nmpure hemp tarn (short fiber)	$4,625.00/ton (FOB China)
10.5nm pure hemp yarn (short fiber)	$4,650.00/ton (FOB China)
16nm pure hemp yarn (short fiber)	$5,250.00/ton (FOB China)
18nm pure hemp yarn (short fiber)	$5,500.00/ton (FOB China)
11s hemp cotton blend yarn (h55c45)	$3,062.00/ton (FOB China)
21s hemp cotton blend yarn(h55c45)	$3,525.00/ton (FOB China)

Retail Prices for Hemp Products

1996 retail catalog prices for hemp fabric from The Ohio Hempery. USA:[lxx]

100% hemp summer cloth, 8 oz. 58" wide 1-19 yards $15/yd.; 20-50 yards $12/yd; 51-164 yards $10/yd. 165-yard roll $1,2221.

100% hemp denim, 12oz. 59" wide 1-19 yd $20/yd; 20-109 yd $16/yd; 110-yd. roll $1,126.

100% hemp canvas, 12 oz. 59" wide 1-19 yd $20/yd.; 20-109 yards $15/yd.; 110-yard roll $1,126.

Silk blend 60%hemp/40%silk fabric 57" wide 1-19 yards $20/yd.; 20-99 yards $6/yd.; 100-439 yards $12/yd.; 440-yard roll $4,485.

Denim blend, 11oz. 55%hemp/45% cotton fabric 59" wide 1-19 yards $12/yd.; 20-109 yards $9yd.; 110-yard roll $596.20.

1994 retail catalog prices for hemp fabric from Hemp Traders. USA:[lxxi]

100% hemp summer cloth, 7 oz. 59" wide 1-20 yd $12.40/yd; 21+ yd $10.33; 219 yd roll $8.26/yd.

100% hemp canvas, 11 oz. 59" wide 1-20 yd $15.59; 21+ yd $12.99; 164-yd roll $ 11.25/yd.

100% hemp herringbone, 12 oz. 60" wide 1-20 yd $ 21.36/yd.; 21+ yd $17.80/yd.

1994 retail catalog prices for hemp fabric from Cannabest. USA:[lxxii]
100% hemp summer weave,(from China) 8 oz. $15/yd.
100% hemp canvas (from China) 12oz. 60"wide $18/yd.
100% hemp canvas (from Hungary) 13oz. 60"wide $18/yd.
100% hemp canvas (from Russia) 11oz. 60"wide $18/yd.
100% hemp herringbone (from China) 12 oz. 60"wide $18/yd.
100% hemp herringbone (from Hungary) 13oz. 60"wide $18/yd.
100% hemp herringbone (from Hungary) 19oz. 60"wide $18/yd.
55% hemp 45% cotton, denim blend 11oz. 60" wide $16/yd.
85% hemp 15% flax (from China) 12oz. 60" wide $16/yd.
85% hemp 15% flax (from China), whitened with H2O2, 12oz. 60" wide $16/yd.
51% hemp 40% cotton 9% flax twill weave, 8oz. 60" wide $16/yd.

1996 retail catalog prices for hemp fibre and hurds from The Ohio Hempery. USA:
Fibre 1-9 lbs., $15/lb.; 10-50 lbs., $10/lb. Hurds 1-9 lbs., $7/lb.; 10-50 lbs., $10/lb.

1996 retail catalog prices for hemp yarn from The Ohio Hempery. USA:
Single ply, wet spun, 18 count, approx. 2 1/2 lbs. per cone, 8,000 yards per cone, 1 cone - $62.50, 2-12 cones - $50 per cone.

1996 retail catalog prices for edible hemp seed from The Ohio Hempery. USA:
1 lb. seed $5; 5 lb. seed $18; 50 lbs. seed $72.

1995 retail catalog prices for edible hemp seed from Green Lands. The Netherlands:[lxxiii]
250g. seed $1.40; 500g. seed $2.80.

1995 retail catalog prices for edible hemp seed from Du Petit. Germany:[lxxiv]
250g. seed 2.50 DM; 500g. seed 4.50 DM.

1995 wholesale prices for edible hemp seed oil from Green Lands. The Netherlands:
100ml. bottle (brown glass) $5.35 per bottle 1-99 bottles; $4.00 per bottle 100-500 bottles; $2.70 per bottle for 500+ bottles.

1995 wholesale prices for edible hemp seed oil from Du Petit. Germany:
100ml. bottle - 5.50 DM/bottle in cases of twenty.
250ml. bottle - 11.00 DM/bottle in cases of four.

1997, wholesale price for hemp seed oil in Canada:
C$38.50/kg.

1996 retail catalog prices for hemp seed oil from The Ohio Hempery. USA:
8.5 fluid ounce bottle $14.95.

1996 retail catalog prices for hemp seed flour from Vermont Hemp Company. USA:
$4.00/lb.; 10lb. case $30.00; 50lb. case $135.00

1997 retail catalog prices for hemp seed flour from Vermont Hemp Company. USA:
$5.00/lb.

1996 retail catalog prices for hemp seed oil from Vermont Hemp Company. USA:
Pressed from non-sterile seeds $150.00/gallon or $125.00/gallon for a case of four.
Pressed from sterile seeds $125.00/gallon or $100.00/gallon for a case of four.

1996 retail catalog prices for hemp seed from Vermont Hemp Company, USA:[lxxv]
Grade AA $5.00/lb.; grade A $4.50/lb.; grade B $4.00/lb.; grade C $3.50/lb.

Prices for Hempen Ale in New York, distributed by Brooklyn Brewery, April 1988:[lxxvi]
A 12-ounce bottle of Hempen Ale can cost from 99 cents to $1.75 in the United States.[lxxvii]

1998 retail prices for hemp fiber board (medium density fibreboard made from hemp stalk core and UF resin bonding technology) from Industrial Ag. Innovations in the US:[lxxviii]
4'x48"x3/4" $61 for 1-4 units; $54 for 5-10; $45 for 11-50; $38 for 50-200.
1.5'x8'x3/4" $25 for 1-4 units; $20.50 for 5-10; $17.50 for 11-50; $14.50 for 50-200.
3.5'x5'x3/4" $34 for 1-4 units; $28.50 for 5-10; $23.50 for 11-50; $19.50 for 50-200.

Markets for Hemp Pulp

Some paper manufacturers already have the equipment to process decorticated hemp fibre into paper.[lxxix] The leading European supplier of non-wood pulp, Celesa, currently produces about 10,000 tons per year of pulp from hemp. The use of hemp pulp in blends with recycled fibre of other non-wood fibres is growing. Tests by several European pulp and paper producers suggest that hemp pulp may replace cotton cost effectively in several specialty paper applications.[lxxx]

Potential Markets for Medical Application of Low-THC Hemp Cultivars

Many cannabis medicines have been produced using cannabis cultivars high in THC,[lxxxi] and there has been medical research into cannabis that is low in THC and high in CBD. CBD is a cannabinoid that does not have abuse potential. CBD has been used to treat the following medical conditions: epilepsy,[lxxxii] dystonic movement disorders,[lxxxiii] inflammatory disorders,[lxxxiv] pain, chronic insomnia,[lxxxv] chorea,[lxxxvi] cerebral palsy, and Tourette's syndrome.[lxxxvii] According to a July 1998 report by the National Institute of Health, CBD may hold promise for preventing brain damage in strokes, Alzheimer's disease, Parkinson's disease and even heart attacks and has been found to prevent brain cell death in an experimental stoke model.[lxxxviii] CBD has been found to mitigate or suppress the narcotic effects of THC, and therefore it is bred to occur in high concentrations to receive certification for sowing.

Manufacture and Marketing of Hemp Products in South Africa

There is an existing market in South Africa for imported hemp products such as hemp textiles, edible oil, body care products, cosmetics, paper, cigarette papers, fibre for wrapping plumbing fittings, and twine. Several hemp products are manufactured in South Africa from imported raw materials including clothing, soaps, shampoo, jewelry, coffee filters, and upholstery. Mclean Textile Company in Cape Town is an importer and distributor of hemp fabrics.[lxxxix] Hemporium is a manufacturer of hemp textiles, cosmetics, and body-care products based in Cape Town.[xc] Hemporium has used about 5,000 meters of imported hemp fabric in the past year with

a wholesale value of approximately R150,000. Hemporium body-care products include hemp shampoos, conditioner, body lotion, and hemp soaps. Irie Hemp is an importer of hemp fabrics, oil, and cigarette papers. Irie Hemp is a manufacturer of hemp clothing, hemp shampoos, conditioner, soaps, and body-care products retail hemp shop and manufacturer of hemp soap and 100% hemp clothing.[xci] Irie Hemp opened a retail outlet in Melville in April of 1997 and also supplies hemp products to stands at two weekly markets in Gauteng. Irie Hemp imported about R25,000 worth of hemp products in the past year, and purchased domestically and additional R28,000 worth of hemp fabric. Irie hemp employs two people full time, in addition to weekend market staff. Irie Hemp operates two hemp stalls at weekend markets. Value added manufacture of hemp products by Irie Hemp has provided additional employment equivalent to at least three part time jobs. Irie Hemp offers licenses to those who wish to open similar hemp shops in other areas. The Hemp Shop in Cape Town opened in 1996 and sells a range of locally manufactured hemp products including textiles, and home furnishings as well hemp shampoos, conditioners, soaps, and nutritional oil.[xcii] Sensi Thread is a Cape Town is an importer of hemp fabric and yarn, and a manufacturer and exporter of hemp and hemp/cotton blend fabrics.[xciii] Sensi Thread produces about 1000 pieces of clothing per month for export and local delivery. Garments are made up of ladies jackets, pants, skirts, and blouses. Tessa Sonik Fabrics, a wholesaler of locally manufactured home furnishings, used 260-300 meters of hemp fabric in the past year.[xciv] Supply has been limited as foreign mills frequently require an entire container load to be purchased. The heavy canvas fabric used for upholstery has been unavailable from South African distributors. Sunshine Productions is reported to be manufacturing hemp clothing near Durban.[xcv] Rustenburg Building Materials sells hemp fibre to wrap plumbing fittings.[xcvi] Green Leaf Africa has a retail stand at the Rosebank Sunday Market.[xcvii] Green Leaf Africa imports and sells both fabric and twine, and manufactures hemp clothing, jewelry, hats, bags, and pillowcases. These locally made products, along with locally made shampoos and bodycare products are sold wholesale to other shops in South Africa, at the Rosebank Market stall, as well as at fairs and festivals. Green Leaf Africa has imported about 1,000m of fabric in the last year. A Johannesburg company reportedly imported R50,000 worth of hemp oil in the past year for local markets.[xcviii] Cansat Agency in Kwa Zulu Natal is an importer of hemp fabrics and hemp paper, and a manufacturer of hemp clothing.[xcix] A health shop at Benmore Gardens in Johannesburg is reportedly selling hemp shampoos and body-care products.[c] Kashgar CC is and importer and retail supplier of carpets which are being marketed as 100% hemp, and their projected imports for 1998 are approximately 10,000 square meters of these hemp carpets, with an imported value of about $25,000.00.[ci]

INDUSTRY NEEDS AND PRODUCTION FACTORS

Substitution of Wood Fibre

Hemp fibre and hurd can be utilized in manufacturing processes used in the wood-based panel products industry and in the pulp and paper industry with modification of existing machinery. Current volumes of wood fibre consumed in these two industries is estimated to be at least 1,305,000 tons per year, with and additional 800,000 tons exported.[cii] If ten percent of this volume were to be augmented with hemp fibre in the future, there would be a need for an annual planting of hemp of more than 13,000 hectares for domestic production and an additional 8,000 hectares to supply ten percent of the export market.

In addition to a harvest of fibre, farmers could harvest more than 20,000 tons of highly nutritious hemp seed per year from the same crop. This land could be used in rotation with other food and fodder crops, or a nitrogen fixing fibre crop such as sun hemp.

Substitution of Wood Fibre in the Eastern Cape

Expansion of forest resources in the Eastern Cape has been identified as a means to support major new investments in forest products industries, and the estimated potential new aforestation amounts to 120,000 ha. If 10 percent of this area were planted in hemp, or 12,000 hectares, this could yield 120,000 tons of stalk per year, and the same land could produce other fibre, food, fodder, and fertilizer crops in rotation. This could provide jobs for many people in the Eastern Cape and other regions of Southern Africa. Hemp could serve as a 'transition fibre crop' for farmers and provide a quick economic return for supply of fibre to industry until tree crops begin to produce income.

Agronomic Production Factors

Hemp is reported to grow best in ambient temperature ranging between 14 degrees C and 27 degrees C, although it can endure greater temperature variation. Seedlings can survive a short frost of -8 to -10 degrees C, while older plants tolerate frosts of -5 to -6 degrees C.
Hemp in northern latitudes grows best on rich and fertile soils in which the subsoil is fairly retentive of moisture. Canadian experiments have shown that hemp takes less nutrients from the soil than wheat or corn when taking into account that up to 70 percent of the nutrients absorbed by the hemp plants are returned to the soil by falling leaves. Removal of leaves and flowers in the field allows for maximum nutrient recycling. [ciii]
Optimum seeding depth for hemp is two to four centimeters. Row spacing is usually 6 to 15cm when using a narrow width seed drill. Recommended seeding rates for fibre hemp vary between 40 and 150 kilograms per hectare (kg/ha), corresponding to plant densities of about 200 to 750 plants per meter shortly after emergence. Hemp grown for seed is sown at seeding densities of 1 to 24 kg/ha. (5 to 120 plants per square meter).

In 1997, Hemcore planted 5,400 acres of hemp. Seeds were sown at a rate of 50kg./ha and fertiliser was applied at a rate of 120kg./ha Nitrogen, 100kg./ha Phosphate and 160kg./ha Potash. The fertiliser was applied before seeding. No herbicides, insecticides or fungicides were necessary.[civ]

Hemp Genetic Resources

A very limited variety of hemp seed is currently available on the international market. All of the 45 hemp cultivars registered or in commercial trade are European. All of these cultivars were developed in and for regions north of the 45th parallel and in general will not perform well if moved closer to the equator by even as little as 10-15%. No developed hemp varieties exist that are suitable for equatorial or subtropical latitudes. Currently, only unimproved cultivars with fibre content below 20% and THC levels that may reach 3% satisfy the daylength restrictions of tropical areas.[cv] An enormous reservoir of natural variation is maintained by local cultivars of cannabis, which may prove invaluable in the future.[cvi] There is an immediate need for a tropical hemp collection and equatorial facilities established for tropical hemp variety

development.[cvii] The Agricultural Research Council's Tobacco and Cotton Research Institute commenced a hemp breeding program commissioned by the Southern Africa Hemp Company. This program may be the only project in the world that is currently collecting local landraces for crossbreeding with high-fibre, low-THC European cultivars. The TCRI has established a cannabis germplasm collection and plans to introduce certified hemp cultivars to South African farmers in three to five years.

Harvesting and Primary Processing Technology

Primary processing has conventionally consisted of field retting,[cviii] allowing the pectin holding plant fibres together to begin to break down. In addition to or in place of field retting, some crops are water retted in streams or shallow ponds built for this purpose. Mechanical decortication is used to separate the fibre from the hurd. Decorticators can be stationary units, or mobile units transported from field to field. Hemp can also be harvested with a conventional forage harvester. Harvesting chopped stalk, with a forage harvester, can generate gross revenue for farmers comparable to corn.[cix]

- Silsoe College,[cx] in Bedfordshire, Great Britain has developed a hemp decorticator that is able to extract fibre from the stems of crops such as hemp and flax cheaply.[cxi]
- Hemcore of Felsted and JB Plant Fibres of Anglesey have devised machinery that can separate hemp fibre from the core without compromising its strength.[cxii]
- A Canadian inventor, with 36 years experience inventing harvesting and processing equipment, has recently developed a harvester, seed press, and a portable decorticating mill with a capacity of 10 tons per hour.[cxiii]
- Hill Agra Sales of Ontario Canada have developed portable decorticating units capable of separating fibre and hurds in the field. Their 1-ton/hour capacity model sells for $65.000.00, and their 1.5-ton/hour capacity model sells for $80,000.00.[cxiv]
- Rapsenergie Kautzen has developed a harvester that collects the seeds and, at the same time, cuts the stalks, which are then left to field-ret.[cxv]
- German researchers have recently established of ultra-sound processing facilities. The stiffness and coarseness of ultra-sound processed hemp fibre makes it suitable for industries without need for fine qualities, such as the construction sector.[cxvi]

Hemp Pulping Technology

Several innovative pulping technologies are currently promoted for the production of less costly hemp pulp, and their use is expected to improve hemp's competitiveness in the mass paper market.[cxvii] Peroxide bleached mechanical pulps from hemp, kenaf, and jute prepared by the APXP extrusion-pulping method can compete with wood pulp in a variety of paper applications. A mechanical process is preferred to the chemical process of pulping due to its higher yield, smaller scale, lower chemical and water use and lower effluent production.[cxviii] Other research has concluded that the technology best suited for pulping of hemp is alcohol-based ammonia-sulfite (AAS) pulping where aqueous organic (aqueous alcohol) solutions of ammonia and sulfur dioxide are used as pulping liquors. Approximate calculations have demonstrated that the production costs for AAS pulp from the whole hemp stalks would be 2 - 2.5 times lower

than those of kraft pulp. The whole amount of alcohol and over two thirds of the ammonia can be recovered from a spent solution by simple distillation. The AAS pulping is unrivaled in selectivity and extent of delignification of raw materials. A Ukrainian researcher has developed an alternative technology to pulp hemp biomass without separation into bast and shives, resulting in a bleachable pulp yield of 60-65%. The remaining plant matter can be converted into highly efficient organo-mineral fertilizers by using an environmentally safe and effluent free method.[cxix] As the hemp and flax fibers are low in lignin, theoretically less energy and fewer chemicals are needed to pulp them. According to research carried out by AT0-DLO in Wageningen, it is better to pulp the bark and the hurds separately, and a mixed chemical-mechanical process is the most suitable pulping method for both the fibers and the hurds. Yields of 80% high-value printing and writing-grade pulp can be obtained from the bark fibers, and 70-80% newsprint grade pulp, from the hurds. A mechanical hemp pulper suited to processing paper and board grade fibre is commercially available in the United States.[cxx] Because a high-value pulp is produced from flax and hemp fibers, small-scale pulping (8-60 tons / day) is viable for the supply of niche markets. A major factor dictating the large size of pulp mills today is the cost of chemical recovery. The introduction of newer, cleaner pulping methods currently under development such as alcohol, potassium or bio-pulping could allow smaller-scale pulping to become a mainstream commercial reality.[cxxi]

Transportation

Advanced processing reduces transport cost and increases the marketability of hemp.[cxxii] Un-processed hemp stalk has a low-density relative to timber, and can cost significantly more to transport as the radial distance to the manufacturer increases. While very large mills would require vast areas of hemp, and could encounter transportation and storage problems to supply all of their production needs; in the long term, it is not the size of the mill that counts but the price of the pulp.[cxxiii] One approach is to compact the hemp prior to shipping. Compactors are available as stationary or semi-mobile units that can increase the density by a factor of at least 2:1 or 3:1. Machinery currently in use in South Africa for compacting cotton can be used to compact hemp. Research and development is ongoing worldwide to develop mobile processors to crush, hammer and sift hemp for use in the pulp and paper and fibreboard industries. Such value added processing could allow 10 to 20 times more material to be shipped per volume.[cxxiv]

Regulatory Protocol for Hemp Production

Regulatory precedents that will apply to South Africa include policy from the United Nations (UN), European Economic Community (EEU), France, the U.K., Germany, Canada,[cxxv] and the USA.[cxxvi] Hemp is production is regulated in some countries and provinces by the Department of Agriculture,[cxxvii] and in others by the Department of Health,[cxxviii] A manifest system of payment by farmers for the licensing and inspection of crops can provide resources for authorities to monitor and regulate hemp production.[cxxix]

<u>Requirements for farmers to be eligible to cultivate hemp in these countries include:</u>

- Applicants must already be farmers.
- Applicants must demonstrate a pre-determined buyer for their crop.[cxxx]
- Applicants must provide adequate security, and prevent unauthorized access.[cxxxi]
- Applicants must pay a licensing fee to enable authorities to inspect their crop.[cxxxii]

Stipulations regarding compliance include:

- Seed must be obtained from a certified supplier.[cxxxiii]
- Recording and reporting of data on sowing, harvesting, and transport.[cxxxiv]
- THC levels must not exceed limits established by respective legislation.[cxxxv]
- Material left over from harvest must be tilled into the soil or destroyed.[cxxxvi]
- Licensee shall inform the authorities of any theft or losses of the hemp crop.[cxxxvii]
- The license and any stocks of hemp shall be produced for inspection upon request.[cxxxviii]

Specific THC levels for hemp cultivars must be established for planting by South African farmers based on international precedents and ongoing agronomic research from field trials in South Africa. Regulations currently being put forth in other parts of the world propose THC limits for new licensed cultivars to be set at 1.0%THC.[cxxxix] Some legislation provides for THC levels in the field to drift up to 1.5%, or 2.0%,[cxl] during the course of one or two season's. Levels above established limits could result in the confiscation or destruction of the crop. The European Economic Union has restricted the THC levels in hemp cultivars to 0.3%. This low level significantly reduces any abuse potential for hemp, but it limits farmers to a narrow range of productive hemp cultivars. It also sets a difficult precedent for South Africa to follow, because THC is part of the plant's defense against both pests and UV radiation. EU cultivars grown in areas with hot, dry climates and a thin ozone have been found to produce more THC than they do in the North.

Farmers must purchase certified seed from a certified seed supplier every one or two seasons to ensure that THC levels do not increase the field pollinated crop. Some farmers may try to save money by planting their own seed, instead of buying new seed every one or two seasons. For this reason crop inspections may need to be done, as local dagga can pollinate the hemp, and THC levels can drift upwards if the hemp seed is not reproduced in isolation. Cannabis pollen can travel up to several kilometers. Hemp pollen will also cross with dagga cultivars and can significantly reduce the potency of the drug cultivars. There is likely to be little crossing of these two crops in actual field conditions, as dagga is grown far from the transportation infrastructure, and not in commercial farming areas.

International Legislation

Legislative precedents that apply to South Africa include policy from the United Nations (UN), the European Economic Community (EEC), the U.K., Germany, Canada, New Zealand, and the US.[cxli] The UN Single Convention Treaty on Narcotic Drugs of 1961 makes the distinction between hemp and marijuana.[cxlii] EEC legislation was drafted in 1988 to provide for the expansion of domestic seed production as the crop was subject to direct competition from imported hemp seed.[cxliii] Subsequent EEC legislation has provided aid for domestically produced flax and hemp.[cxliv] U.K cannabis legislation was amended in 1977 to exclude hemp stalk, fibre and seed from prohibition.[cxlv] The US produced hemp legislation in 1970 that exempted hemp stalk, fibre, cake, and sterilized seed from prohibition.[cxlvi]

Recent legislation lifting restrictions on hemp production has been enacted in the U.K, Germany, and Canada.[cxlvii] US Farmers and agricultural organizations in Kentucky[cxlviii] and New Hampshire[cxlix] have filed two federal lawsuits in 1998 calling for a lifting of restriction on hemp

production. Legislation providing for hemp research,[cl] and regulation has been introduced in eighteen states in the United States since 1995. The states of Colorado,[cli] Hawaii,[clii] Iowa,[cliii] Kansas,[cliv] Kentucky,[clv] Minnesota,[clvi] Missouri,[clvii] New Hampshire,[clviii] New Mexico,[clix] North Dakota,[clx] Vermont,[clxi] and Virginia[clxii] have had hemp legislation introduced. Petitions are being circulated in Alaska,[clxiii] California, and Oregon[clxiv] to put hemp initiatives on upcoming ballots.[clxv]

South African Legislation

Hemp can be grown for research purposes only under license from the South African Department of Health.[clxvi] Hemp seed is imported under permit from the Department of Health,[clxvii] and the Department of Agriculture,[clxviii] for research purposes only. Cannabis was originally prohibited under the Medical, Dental and Pharmacy Act (No. 13 of 1928). Four acts of parliament may need to be amended in order for hemp to be regulated as a commercial agricultural crop in South Africa. These Acts include: the Medicines and Related Substances Control Act No. 101 of 1965 (schedule 8, 399:1); the Drugs and Drug Trafficking Act No. 140 of 1992; the Agricultural Pest Act, 1983 (Act. No. 36 of 1983); and the Conservation of Agricultural Resources Act administered in 1987 by the Directorate of Soil Protection of the Department of Agriculture and Water Supply.[clxix]

If South Africa has adopted the UN treaty entitled: "Single Convention On Narcotic Drugs", then this may affect the existing legislation regarding cannabis in South Africa, as it makes provisions for the production of hemp as an agricultural commodity.[clxx]

A formal legal framework and permitting system for the import, export and taxing of hemp products in South Africa needs to be established. This framework could also include quality control and certification according to established international hemp industry standards.[clxxi] In June of 1998, the South African Plant Fibre Cluster presented the Department of Health and the Department of Agriculture with hemp policy recommendations. These recommendations called for a transfer of authority from the Department of Health to the Department of Agriculture to administer to hemp research and production with certified low THC European hemp cultivars.[clxxii] The South African Plant Fibre Cluster also presented a draft hemp resolution requesting the Department of Health and the Department of Agriculture to establish a joint committee to review existing legislation and make recommendations.[clxxiii]

In May of 1998 agricultural and development consultant Doug Bosman submitted a proposal to the Eastern Cape Department of Agriculture to prepare a feasibility study on the establishment of a hemp industry. This document called for the development of legislation to permit the legal production of hemp, along with necessary control measures to be put in place. The document also called for funding to be made available for the necessary trial and fieldwork to be done by the Tobacco and Cotton Research Institute.[clxxiv]

The Legislative Research Unit of the Eastern Cape Provincial Legislature wrote a report on hemp in South Africa in April of 1998.[clxxv] The report identified three acts of parliament that may need to be amended in order for hemp to be a legal crop in South Africa. Member of Parliament Andre de Wet introduced a motion calling for feasibility research into hemp production in August of 1998, which received unanimous approval.[clxxvi]

The Rastafarian Burning Spear group made submissions calling for a lifting of restriction on the production of hemp to phase one and phase two of the drafting of the constitution. The Burning Spear were invited to attend on the day the new constitution was adopted, when they presented President Nelson Mandela with a hemp and silk shirt. According to Bernard Brown, head of Burning Spear, "We strongly feel that hemp must be utilized by indigenous people to uplift themselves and that the RDP need not beg funds from the international community."[clxxvii]

Legislation in other countries can be used to guide the policy development process in South Africa. The first step is for a legal distinction to be made between hemp and marijuana (dagga). When cannabis was first restricted by legislation in the early half of this century, the chemical compound in cannabis with abuse potential, THC, had not been isolated. THC was not identified until 1964 and therefore some early legislation, like that in the US, provides for commerce in cannabis stalk and seed, but does not quantify or qualify THC levels. Legislation in the European Union (EU) limits THC levels to 0.3%. Similar THC limits have been set for hemp in Russia and Canada. Hemp in excess of 0.3% THC can be grown in several countries including Austria, China, Hungary and India. Many of the world's hemp cultivars that are held in collections in gene banks and rural villages exceed EU levels for THC. Therefore a great deal of genetic material is available for cultivation and breeding that is not allowed to be grown commercially in countries which permit only EU certified cultivars. While the development of hemp cultivars with THC levels below 1.0% effectively eliminates the potential for abuse, it may have disadvantages for hemp farmers. THC may play a beneficial role in the plant as a defense against insect pests and exposure to UV radiation.

CURRENT HEMP RESEARCH AND DEVELOPMENT

International Hemp Research and Development

Europe

In February 1996 the European Community (EC) approved a three-year Research, Technological Development and Demonstration proposal, (The Hemp For Europe - Manufacturing and Production Systems Project). Ten partners from five European countries' centers of excellence in plant breeding, agronomy, crop processing, and product development, and a number of commercial companies, submitted the project. The purpose of the project is to overcome some of the limitations to the development of the hemp crop in the EU by addressing the following specific objectives:

- Produce cultivars with improved fibre production characteristics, low THC content, and pest and disease resistance.
- Develop from crop physiology studies and crop modeling, cost effective crop management systems for the main climatic areas of Europe, and field evaluate.

- Improve current harvesting systems by study of crop management and machinery development.
- Adapt novel technology for the improved extraction of hemp bast fibres.
- Characterize, in relation to end-product use, the effect of production, harvest and extraction techniques on fibre quality.
- Develop innovate new materials and products and initiate commercial production.

An integrated work program has been produced to ensure the full integration of the activities and materials produced, and to maximize the information generated.[clxxviii]

Australia

A license was granted in 1994 for a semi-commercial sized hemp plot to evaluate crop performance on a commercial scale, and assess the suitability of local machinery.[clxxix]

In 1996 licenses were issued to eight farmers and two research officers from Agriculture Western Australia. Australian Minister of Agriculture, Bill McGrath said the hemp trials were part of the Rural Victoria 2001 program, and offered significant economic benefits.

The Australian Rural Industrial Research and Development Corporation published a 1995 Australian hemp production feasibility study as well as a 1997 market report on hemp.[clxxx]

Australian Newsprint Mills Ltd. (ANM Ltd.) produces approximately 40% of Australia's newsprint, totaling 250,000 tones annually. Their mill, the first plant in the world to produce newsprint from eucalyptus, is one of Tasmania's biggest employers. ANM has joined with academia and government to conduct a feasibility study to determine hemp's potential value for paper production. ANM will conduct papermaking trials, and plant material will be made available for trials to other interested manufacturers. A license has been granted for a semi-commercial sized plot to evaluate crop performance on a commercial scale, and assess the suitability of local machinery.[clxxxi]

Canada

Canada granted its first public research permit for industrial hemp cultivation in 1994.

Post harvest material from Canada's first 5-hectare research crop was contracted for fibreboard research at Washington State Wood Composite Laboratory.[clxxxii]

In 1995, 12 permits were granted, including one for seed production and two for research test plots maintained by government agricultural departments.

In 1996, licenses were granted to eight groups in Ontario, Manitoba, and Alberta to plant 36 acres of hemp for research purposes. These research plantings evaluated about 20 different cultivars to determine their suitability for fibre and oil production in Canada.

In May of 1996, a Member of Parliament submitted a motion onto the floor of the House of Commons to move the regulatory authority of industrial hemp from the Ministry of Health to the Ministry of Agriculture.

On 13 March 1998 Health Minister Allan Rock confirmed regulations were in place to permit the commercial cultivation of industrial hemp for the 1998 growing season. The Minister said, "For the first time in 60 years, Canadian farmers who meet the required provisions can now plan to grow hemp this spring. Because of the efforts of the Liberal Rural Caucus and members of the agricultural community; the development of regulations was given top priority by Health Canada. This new crop has a tremendous potential for creating new jobs in agriculture, industry, research and retail."

Alberta Research Council's Forest Products Department (ARC) in conjunction with the Department of Renewable Resources, University of Alberta (U of A) has carried out research to ascertain the suitability of hemp as furnish source for panelboard products.[clxxxiii]

Hemp Canada held a workshop on hemp regulations in Jan. of 1998. The two main issues that emerged as potential hazards for the Canadian hemp industry were the limited varieties of seed available under the current regulations, and the low level of THC allowed, which further limits the number of cultivars that can be grown in Canada.

The Canadian Industrial Hemp Network is a joint venture of the Toronto Design Exchange, the EcoDesign Group, and ORTECH Corp. to identify the economic, technical and design opportunities and barriers to establishing a hemp industry in Canada.[clxxxiv]

The Natural Order,[clxxxv] an environmentally oriented research and development company, has received $60,000 in funding for hemp oil research. The funding comes in the form of a matching grant from Grow Ontario, an initiative of the Ontario Ministry of Agriculture, Food and Rural Affairs. LifeMax, a manufacturer of natural food products, and Nature Clean, a manufacturer of environmentally safe household and cleaning products, are among the 10 participants who have agreed to run pilot tests on the hemp oil for their products. Together with a western partner, The Natural Order plans to determine which strain of hemp will yield the most seed and highest quality oil, and how this oil can be used by industry. Companies participating from different industry sectors will quantify the applications and marketing of the oil.[clxxxvi] The Natural Order will provide test quantities of hemp seed oil and data for participating researchers, as well as assistance in securing science and research tax credits for their work. The Natural Order has applied for a permit to grow as many as 30 low-THC cultivars to determine which strain of hemp will yield the most seed and highest quality oil. The locally produced oil will then be distributed to participating companies for a second series of tests.[clxxxvii]

China

China's Environmental Protection Agency (NEPA)OFDC recently established an office in one of China's traditional hemp growing regions. Part of the reason for setting up this office is to see if an organic certification process can be established to help farmers and manufacturers market hemp products to the environmentally sensitive markets of Europe, Australia and the United States.

The International Society for Tropical Man-Made Community and Biodiversity has begun a research project to investigate the current state of hemp farming in one of China's traditional hemp growing regions, in order to enhance its productivity. Expectations based on similar

projects in China indicate that the introduction of seed developed in Europe may increase bast fibre yields.[clxxxviii]

Finland

The Hankasalmi Hemp Project began in the fall of 1994 in co-operation with the Culture Secretary of Hankasalmi Finland. The project was intended to determine a small-scale model for hemp cultivation to allow individuals to produce limited runs of specialty paper, yarn, and fabrics for income generation and creative expression. The primary goal of the project was to return some amount of autonomy to the agricultural community. Two French varieties were planted in 1995 at several test-plots throughout Finland. Futura-77 and Fedora-19 were seeded at densities of 50-100 seeds/m2. Reporters were invited to a planting of an educational plot, in the center of a village with 3,000 inhabitants. The difference between hemp and marijuana was carefully explained.

Some plants reached 400cm. Fibre from the dried, retted stalk was hand-collected by a children's art class and used to produce hand made paper. Over 30 articles were published in Finnish newspapers and agricultural magazines about the project.[clxxxix]

France

The Federation Nationale des Producteurs de Chanvre (FNPC)[cxc] markets EU certified hemp seed. FNPC conducts research on breeding, agronomy, and processing of hemp.[cxci]

Germany

Ecco[cxcii] is working on a process that uses ultrasonic sound waves on hemp submerged in water to extract the fibre from the stalks, without the need for intensive chemical or mechanical processing. A by-product of this process is lignin, which can be used as an organic glue or fertiliser. A steam explosion process has been developed that creates a cotton-like material, while retaining hemp's high strength and low elasticity. The resulting 'cottonized' hemp can be spun using existing textile technology.

The German Environmental Foundation contracted the nova Institute and two research partners to evaluate major potential markets for hemp products and identify the product lines which can be implemented in the next three to five years under economic, technical and environmental criteria. They have published a 500 page Hemp Product Line Project Report that is currently available in German only.

The Institute for Applied Research (IAF) at the Reutlingen began to investigate fibre harvesting and fibre separation processes for hemp in 1994.

Humboldt University, Berlin, is conducting research to develop new low-THC varieties.

The Agricultural Research Laboratory in Braunschweig began research in 1992 to investigate the variability of THC content, the impact of chemical nitrogen fertilizer, plant density, fibre quality, as well as fibre and seed yield.[cxciii]

Gesamthochschule Kassel is investigating the use of hemp as a boiler fuel.

Ireland
Teagasc, an agricultural and food development authority partly funded by the Government of Ireland, has been conducting hemp trials for the past four years under license from the Department of Justice. Teagasc has been testing its properties as an energy source to burn in power stations. The government of Ireland is holding an international competition to find the best design for a biomass power plant, which would burn hemp, waste paper, and chicken droppings. The plant could be in operation by 1999, and generate electricity for 30,000 homes, or 1% of Ireland's total energy needs.[cxciv]

Jamaica
Five acres of experimental test plot have been reserved for testing hemp at Bowles Experimental Station in Old Harbour, outside of Kingston.[cxcv]

Lesotho
Mr. AM Monyake, managing director of the Lesotho National Development Corporation, stated on June 16 of 1994 that he was keen to persuade his government decriminalize cannabis under "specified regulated circumstances and controls." This would enable the extraction of chemical components for medical use, and the use of the fibre for textiles.[cxcvi]

New Zealand
A 60 page report urging the government of New Zealand to rapidly change legislation prohibiting hemp production was released in March of 1998. The 60-page report was commissioned by the National Community Employment Group. A new product currently under development in New Zealand involves using hemp bast fibre (imported at $1,000/tonne) is replacing fibreglass ($3,000/tonne). This patented process is set to expand into the building product market as a superior wood substitute that is fire resistant and has resilience and deformation properties that surpass steel.[cxcvii]

South Africa
South African industry and research institutions have invested in the research of hemp markets, hemp agronomy, soil and climate mapping, and processing technology. South African industry has formed a cluster to investigate the potential for the domestic production and processing of fibre and oilseed crops including hemp, flax, and kenaf.

Hemp agronomic trials were reported to have been conducted in South Africa around the turn of the century at a time when India indicated that it would restrict the supply of jute fibre being imported into South Africa. These trials were carried out in the Rustenburg area, but were reported to have been discontinued due to theft.[cxcviii]

Agricultural trials were again initiated in the Rustenburg area in 1994 commissioned and financed by members of the South African Bast Crop Consortium (SABCC).[cxcix] The SABCC was formed to introduce and develop bast crops such as flax, hemp, and kenaf. SABCC founding members include the Agricultural Research Council's Tobacco and Cotton Research Institute (ARC/TCRI), PG Bison,[cc] Masonite Africa Ltd.,[cci] and the Southern Africa Hemp Company (SAHC).

SABCC founding members have commissioned and financed agronomic trials with EU-certified hemp cultivars at the ARC/TCRI since 1994. Three of the EU certified cultivars grown produced dry stem yields in excess of 8 tons/hectare, with a maximum yield of 9.5 tons per hectare. These are commercially viable yields that warrant future commercial scale trials. Additional EU-certified cultivars need to be planted as part of commercial scale trials at multiple sites in order to investigate their productive potential.

Research results indicate that high-fibre, low-THC hemp cultivars need to be developed in order to lengthen the growing season and increase the productive capacity of hemp in South Africa. Cultivars of less equatorial origin experience premature flowering due to the short days during most of the year in South Africa. Hemp cultivars grown at similar latitudes in Asian countries are low in fibre and uncertified due to variable THC content. ARC/TCRI research findings have been confirmed by international research.

The SABCC began a hemp research program in Oct. of 1997 to develop higher-yielding, higher-fibre, lower-THC hemp cultivars that are specifically adapted to Southern African conditions. The SABCC has established a cannabis germplasm collection and has begun selecting hemp cultivars that yield over 30% fibre for cross-breeding with southern African cannabis cultivars adapted to a range of soils and climates. The SABCC will continue conducting agronomic trials with EU-certified hemp cultivars, as well as commercial kenaf cultivars, for introduction into South Africa and other regions.[ccii]

According to a 1996 White Paper entitled "Sustainable Forest Development in South Africa", domestic supply of wood fiber could fall short of demand during the next two decades. To address this concern the White Paper recommends that the South African government undertake to develop alternative fibre resources, and provide support for small farmers and entrepreneurs by introducing incentives and minimizing barriers.

Minister of Water Affairs and Forestry, Kader Asmal, spoke at the Eighth International Conference of the Technical Association for the Pulp and Paper Industry of Southern Africa on 16 October 1996. He reportedly said that pulp and paper companies need to recognise the potential of alternative fibre crops like hemp. He also said that hemp can produce yields of fibre equivalent to wood, and will both increase pulp volumes and accelerate local economic development in Southern Africa.[cciii]

The CSIR published a report in March of 1997 on the feasibility of hemp as a raw material for the pulp and paper industry. According to the report, “Hemp’s potential lies outside of the realm of cheap paper production. It has potential applications for specialty papers, but it is probably its potential for textiles and more environmentally friendly bio-composites where there is the most chance of economic viability. This will however not be achieved without extensive research and development. The production of textiles or the production of bio-composites are more likely applications for hemp in South Africa than hemp production for pulp. This could be done possibly in conjunction with seed production. If these applications prove to be economically viable, and suitable hemp varieties can be identified or bred for South African circumstances, then hemp would be an ideal crop for small grower schemes in developing areas.”

The CSIR study estimated the production cost of hemp would be similar to the production cost of maize or cotton.[cciv]

Hemp research trials were privately commissioned at a research facility near George in 1996 and 1997. Four unspecified cultivars were trialed. Plot sizes were 11m2. A dry stem yield of 7.5 tons per hectare was achieved in a stand of 216 plants per m2. Yields with 130 plants per m2 and 88 plants per m2 were 4.2 tons per hectare and 4.4 tons per hectare respectively. Plants were reported to have reached a height of two meters.[ccv]

The Western Cape Department of Agriculture conducted agricultural hemp research trials in 1997 commissioned and financed by the Sensi Thread Clothing Co.[ccvi] of Cape Town. Nine cultivars were grown and some were reported to show tremendous potential, growing up to 2m tall within 5 months. Sensi Thread began importing hemp yarn for manufacturing trials with Berg River Textiles in March of 1997. This exercise is creating several high quality fabrics specifically targeted for the home furnishings industry. Market feasibility studies commissioned by Sensi Thread are reported to show enormous potential for a fully vertical hemp industry within the Cape Province. These range from growing, processing, manufacture and distribution of hemp fabrics and garments.

The Land and Agricultural Policy Institute proposed a feasibility study to investigate the viability of a South African hemp industry in July of 1997. This initiative had the support of the Minister of Agriculture and the backing of the Parliamentary Standing Committee on Agriculture. The LAPC invited all interested parties to submit options and proposals relevant to the study in question to develop and inform the policy process. Respondents included academics and NGO's.[ccvii] According to one local news source, research proposals had "flooded into the LAPC after recent media coverage on hemp."[ccviii] This initiative was later reported to be at a stand still due to departure of LAPC staff.[ccix]

Mercedes Benz South Africa (MBSA) was reported to be probing the possibility of establishing a R100 million natural fibre project in November of 1997, embracing plantations and a processing facility in the Eastern Cape. A feasibility study was conducted to investigate the viability of growing, harvesting, and processing of hemp and other fibres including sisal and flax. The project was reported to have won the attention of the World Bank of New York and the Development Bank of Southern Africa. MBSA, together with Daimler Benz in Germany and the CSIR of Pretoria, identified nine automotive components that could employ natural fibres. It was estimated that up to 4,000 jobs could be created by the R100 million investment. MBSA was reported to be keen to enter into long-term contracts with farmers producing these natural fibres.[ccx]

The CSIR has conducted market feasibility research on hemp, which has identified a rapidly growing market both overseas and in South Africa.[ccxi] The CSIR has conducted soil and climate mapping for hemp, and results are to be published in August of 1998.[ccxii]

The CSIR and the Agricultural Research Council presented a funding proposal to the National Department of Agriculture in November of 1997 entitled the “Development of Bast Fibre Crop Production and Processing Systems in South Africa.” The proposal specifically outlined research on hemp and flax and included letters of support from Daimler Benz, Mercedes Benz

South Africa, the Mpumalanga Department of Agriculture, and the KwaZulu-Natal Department of Agriculture. Funding requested from the National Department of Agriculture for this three year research program totaled R1,861,000.00. The proposal indicated overseas participants would be involved in the project including research organizations from France, Belgium, Germany, Northern Ireland, and Russia. Local participants included the National Department of Agriculture, the National African Farmers Union, and the Industrial Development Corporation.[ccxiii]

Representatives from government, industry, trade associations and research institutions met in March of 1998 to discuss forming a cluster to assist in the development of alternative fibre and oilseed resources. The meeting was part of the Policy Development Process of the Ministry of Agriculture and Land Affairs, and was held at the Agricultural Research Council's Tobacco and Cotton Research Institute near Rustenburg. Fibre and oilseed crops discussed at the meeting included hemp, flax, sisal, and kenaf. These crops were identified as being able to play a key role in rural development projects, where South African farmers can have the opportunity to market these crops while using the same land in rotation with food and fodder plantings.

Meeting participants have recognized the growing role that alternative fibre and oilseed crops are playing in global industry, and have called for further research and co-operation among stakeholders to broaden the support base for the development of alternative fibre and oilseed crops. Initiatives discussed included market research and product development as well as agricultural methods, cultivar development and processing technologies. Also discussed was the need to update existing legislation to clarify the distinction between hemp and dagga, and the need to formulate regulatory policy to enable the development of a South African hemp industry. The transfer of regulatory authority from the Department of Health to the Department of Agriculture was discussed as a way to provide more support for hemp research and development initiatives.

The meeting led to the formation of an interim task team that will investigate the potential of growing flax, sisal, hemp and kenaf on a commercial basis in South Africa. Members of the task team include representatives from the Department of Agriculture, the Department of Trade and Industry, the Eastern Cape Department of Economic Affairs, Environment and Tourism, the Agricultural Research Council, the CSIR, the Industrial Development Corporation, and the Southern Africa Bast Crop Consortium.

The Legislative Research Unit of the Eastern Cape Provincial Legislature wrote a report on hemp in South Africa in April of 1998. The report states that the legalization of hemp can give previously disadvantaged people access to a natural resource that will provide food, clothing, and building materials and enable South Africa’s fragile economy to compete in an increasingly competitive market. The report concludes that South Africans are faced with the choice of becoming competitors in the race to seek economic advantage from hemp or to allow other nations to carve out their niches in the hemp market at South Africa’s expense.[ccxiv]

The South African Bast Crop Consortium submitted a proposal to the Department of Agriculture in June of 1998 to seek assistance with introduction and development of hemp and other bast crops to South African farmers. The proposal identified a need for government assistance with hemp cultivar development, and provides for testing and preservation of these cultivars through

the monitoring of fibre and chemical contents. The program is designed to enable the production and supply of certified seed, as well as provide locally produced seed and fibre for research and product development.

The Department of Arts and Culture has reportedly provided funding for the production of a film on hemp in July of 1998. Free Filmmakers has been commissioned to produce this documentary film.[ccxv]

Ukraine
The Ukraine Pulp and Paper Research Institute (UPPRI) has developed a new ammonia-sulfate-alcohol drip percolation pulping technology for bast fibre crops.[ccxvi]

United Kingdom
Hemcore initiated hemp research and development in the UK.[ccxvii] They sponsored three years of agricultural trials, and two years of commercial plantings; 600 hectares in 1993 and 800 hectares in 1994. Hemcore stated business in 1993 and now has 80 UK farmers, under contract, licensed by the Home Office. Hemcore planted 5,400 acres in 1997. Recently, a UK aircraft manufacturer said it was considering Hemcore matting for its fighter planes and gun turrets. [ccxviii]

Bio Composites Centre in Wales is researching hemp strains to improve the characteristics of the plant for use in industry.[ccxix]

United States of America
The US Department of Agriculture released a white paper in 1995 entitled "Industrial Hemp and Alternative Crops for Small-scale Tobacco Producers". According to the white paper, the USDA insists that production and processing trials are needed to establish the economic viability of hemp production in the US. Legislatures in several states are discussing hemp as an alternative crop, especially for tobacco farmers, whose crop has an uncertain future because of health concerns.

The first permit to cultivate hemp in the US in recent years was issued to Hemp Agro Tech by the US Department of Agriculture, for a planting in 1995 on federally owned land in Imperial Valley, California. This research project tested the growth rates of three different strains of EU certified seed.[ccxx]

The Oregon Natural Resources Council commissioned Oregon State University to do an agronomic review of the potential for growing hemp in the Pacific Northwest. The ONRC also commissioned a law review article to look at the legal issues of industrial hemp in Oregon, nationally, and internationally.

In April of 1996 the Hawaii State Senate passed resolutions to conduct a feasibility study on the potential of industrial hemp as an alternative crop to support former sugar plantation workers on thousands of acres of former sugar plantation land.[ccxxi] Hemp feasibility studies have been commissioned in the past two years by the states of Kentucky, Wisconsin and Vermont.[ccxxii]

The University of Kentucky is conducting research on a commercial hemp feed supplement, called Nutrahemp, that is currently being marketed in several states.[ccxxiii]
Kentucky State University is conducting ongoing research to evaluate hemp's potential. Research into hemp genetics is currently being conducted at Indiana University.

TCLT of Leggett, California is involved with the development of new commercial pulping technologies to make paper pulp from hemp and other fibers. TCLT has long awaited a permit to plant hemp in the US, and now they are reported to be cultivating hemp at their Paper Mill Hemp Farm in California.[ccxxiv]

The North American Industrial Hemp Council (NAIHC) was formed in 1995 to foster relationships between academia, farmers, agri-business, manufacturers, government, public interest groups, and marketing firms with an emphasis on land management, as well as economic and environmental concerns.[ccxxv] The NAIHC secured a $50,000 grant from the Turner Foundation in Oct. of 1997 to support the Council's activities in re-commercializing industrial hemp in North America. The NAIHC is currently underwriting three hemp white papers targeting economics, markets, and regulations.[ccxxvi]

A July 1998 study by the University of Kentucky in the United States predicted that local hemp farmers could expect to clear $200 to $600 an acre, and final figures show that the crop could bring in as many as 771 jobs and $17.6 million in workers earnings.[ccxxvii]

Consolidated Growers and Processors (CGP), Monterey, California, is scheduled to begin a soil reclamation project in Chernobyl, Ukraine, prior to 1999. The project brings cutting edge proprietary technology and processes to this region, which in 1986 was devastated by the world's worst nuclear power plant accident. CGP, a representative for the Institute of Bast Fibres in Glukhiv, Ukraine, will launch a full-scale cleanup in and around the Chernobyl site, with the preliminary work to begin next year. The CGP-led effort will utilize a process known as phytoremediation to revitalize contaminated soil. Preliminary analysis indicates that hemp may be the most technically and economically viable method of removing hazardous radionuclides from the soil. The use of hemp eliminates the costly soil removal and treatment process used at contamination sites.[ccxxviii]

Former Yugoslavia
The Yugoslav Hemp Research and Development Project is currently conducting a hemp breeding program to supply the Yugoslav hemp growers with domestic certified seed of the cultivar "Novosadska konoplja". Existing breeding material is planned for expansion with new accessions from the former Yugoslavia and the Vavilov Institute gene bank. Seed production is being examined through testing of optimum plant density, as well as the effect of storage conditions on the viability of hemp seed. Agronomists from the Institute of Field and Vegetable Crops in Novi Sad,[ccxxix] mechanical engineers from the Faculty of Engineering Sciences in Novi Sad, and the Faculty of Mechanical Engineers in Belgrade have embarked on a joint project to develop more suitable mechanization of hemp fibre and seed.[ccxxx]

CONTACTS FOR MORE INFORMATION

Hemp Industry Trade Journals and Magazines

Journal of the International Hemp Association.[ccxxxi]

Commerical Hemp Magazine.[ccxxxii]

HempWorld.[ccxxxiii]

HempTimes.[ccxxxiv]

Hemp Magazine.[ccxxxv]

Hemp Quarterly.[ccxxxvi]

Hemp Pages.[ccxxxvii]

Austrian Hemp Institute Magazine.[ccxxxviii]

Hanfblatt. Des Magazin fur Hanfkultur.[ccxxxix]

Hanf! Das grofste Journal fur Hanfkultur.[ccxl]

Hanf - Bulletin.[ccxli]

International Hemp Organisations

International Hemp Association.[ccxlii]

Hemp Industries Association.[ccxliii]

World Hemp Centre.[ccxliv]

The North American Industrial Hemp Council.[ccxlv]

Hemp Food Industries Association.[ccxlvi]

National Hemp Organizations

Federation Nationale des Producteurs de Chanvre.[ccxlvii]

Canadian Industrial Hemp Council.[ccxlviii]

New Zealand Hemp Industries Association.[ccxlix]

Hemp Industries Marketing Board of New Zealand.[ccl]

International Conferences and Trade Exhibitions

Biofach Hemp Symposium - Frankfurt, Germany.[ccli]

Comercial and Industrial Hemp Symposium - Vancouver, BC, Canada.[cclii]

Hemp Industries Association Convention - Sonoma County, CA, USA.[ccliii]

International CannaBusiness Exposition - Gastrop Rauxel, Germany.[ccliv]

Nordic Conference on flax and hemp processing in Tampere, Finland.[cclv]

Additional Hemp Contacts

Austria
Rohemp,[cclvi] has patented a process to replace polypropylene in fibre concrete with hemp fibre, which costs less than a third the price of conventional petro-chemical concrete.[cclvii]

Zellform,[cclviii] has developed a rock-like material by dehydrating hemp fibre and hurds in pressure sieves to produce slabs for construction, furniture, or insulation.[cclix]

Belgium
Charlie & Co. Driekerkenstraat markets flax tow and hemp working line machinery. Their products include a bale opener that can work with square or round bales and has a capacity of 2-3 tons/hour. Their conveyor belt with metal detector transports the hemp and flax fibres through a series of breaking rollers to a scutching turbine with a capacity of 1800 kg./hour, and shakers with a capacity of 1800 kg./hour.[cclx]

Canada
Canadian Industrial Hemp Council (CIHC) was formed in 1996 to serve as a liaison between farmers, industry, retailers and the government. The CIHC is made up of all sectors of industry, and they are hoping to involve government on their board as well.[cclxi]

The Canadian Pulp and Paper Association and Wiseman Noble produced a one-day symposium on non-wood fibres in January of 1998.[cclxii] According to Wiseman Noble President Sotos Petrides, "The event delivered technical information on non-wood fibres including industrial hemp to 18,000 engineers, mill workers and technical staff".[cclxiii]

France
The Comite Economiqu Agricole de la Production du Chanvre (CEAPC**)** markets seeds and organises production contracts between hemp growers and buyers.

The Co-operative Centrale des Producteurs de Semences de Chanvre (CCPSC) contracts growers for hemp seed production, and purchases and markets seed. [cclxiv]

La Chanvriere de l'Aube hemp growers co-operative patented a technique in 1986 to "mineralise" hemp hurds by coating them with silica to make them moisture-repellent. [cclxv] The resulting product "Canobiote" can be used in loose form as insulation or mixed with cement to create walls and ceilings. The company also markets raw hurds under the trade name Aubiose, as a horse bedding. Leftover hemp particles are moulded into pellets and sold as kitty litter called Biochat in France and All Hugro in Germany. Their product "Canosmose" uses untreated hemp hurds with lime and plaster of paris.[cclxvi] This product can be poured like concrete to provide a vapor barrier as well as thermal and sonic insulation, and can have the consistency of bricks or plasterboard.[cclxvii]

Isochanvre is a patented brand of silica-coated hemp hurds, which have been used to construct over 250 houses.[cclxviii] Isochanvre combines treated hurds with natural lime and water to create a lightweight mixture which can be poured into moulds like cement, hardened into walls, or applied with a trowel for a grainy texture similar to cork.[cclxix]

La Chanvriere du Belonis, is a co-operative founded in 1997 that produces, processes, sells, and utilizes natural hemp for building.[cclxx] They produce Isolaine, an insulation material, as well as Isoconstruction, a mixture of pulp and lime for plastering.

Germany

Schneidersohne,[cclxxi] Germany's largest paper manufacturer, introduced a line of hemp paper products in 1993 and has recently converted 2 mills for hemp-based paper production.[cclxxii]

Daimler-Benz has been exploring the idea of replacing glass fibre with natural materials since 1991.[cclxxiii] Daimler-Benz is currently using hemp in its dashboards and interior door panels.[cclxxiv]

Badische Faseraufgereittung (BaFa) opened the first mechanical processing facility dedicated solely to hemp breaking and decortication of about 10,000 tons of hemp per year.[cclxxv] BaFa has a plant near Karlsruhe, and supplies fibre for hemp mats and fibre-reinforced composites. The hurds are sold as horse bedding and bitumen-coated building materials.[cclxxvi]

Mehabit is treating hemp hurds with bitumen to create floor insulation.[cclxxvii]

Hanfhouse is making hemp paints, and a hemp laundry detergent that contains a mixture of hemp oil and yeast that is biodegradable and cleans better than petroleum-based detergents.[cclxxviii] In independent tests their product not only beat out laundry soaps made from other natural plant oils, but consistently outperformed Germany's leading synthetic brand. Hanfhouse also markets hemp furniture polish and a full range or cosmetics.

Greenhouse is using the fine particles of hemp pulp to make a rigid plastic compound that is biodegradable, breaking down upon contact with water.[cclxxix]

EFKA-Werke, the major German producer of cigarette paper, introduced 100% hemp based cigarette paper in 1994. This product is now being sold around the world.

IF,[cclxxx] is manufacturing all-hemp mattresses, composed of layers of milled hemp hurds and covered in hemp cloth.[cclxxxi]

Ecco Gleittechnik has developed a product called Iso-Hanf, a hemp fleece impregnated with sodium silicate and borate for fire resistance. The use of Iso-Hanf to reinforce concrete increases its flexibility by 30 percent. The dry characteristics and strength of mortar are also improved by Iso-Hanf. Its use in paint increases viscosity and resistance to detergents, and reduces the number of microfissures.[cclxxxii]

Netherlands

A comprehensive study of hemp and its application to paper pulp production was conducted from 1987-1993. The first Three years of the program were carried out at the DLO Research Institute for Agrobiology and Soil Fertility (AB-DLO) in Wageningen.

Researchers on the Dutch Hemp Project from 1990-1994 came to the conclusion that 'organosolv' pulping would be appropriate as a nationally endorsed pulping process for hemp because of its small scale potential, lack of toxicity, and pulping effectiveness.
The first industrial-scale organosolv mill was built in New Brunswick Canada in 1989. Organosolv mills can be economically viable with a smaller ton-per-day capacity, such as 300 tons per day, compared with 1000 tons per day for a Kraft mill.[cclxxxiii]

Hemp-Flax BV purchased a modern flax-processing factory and initiated a project to produce and process 140 ha of hemp in The Netherlands.[cclxxxiv] They are currently moulding hemp hurds into fruit bowls and clocks with standard formaldehyde based binders, and are developing "mineralised" binders that are water resistant and recyclable.[cclxxxv]

Poland

Hemp seed in Poland must be obtained from the Natural Fibre Institute (NFI). The NFI has shifted its focus in the past three years from 10% to 80% on hemp. The NFI recently published a manual for farmers on production techniques including chapters on primary processing and hemp in the organic farming system.

United Kingdom

The Home Office has developed a license to cultivate, produce and be in possession of hemp.[cclxxxvi] Sowing and harvesting declarations for subsidy are processed under the charge of the Intervention Board for Agricultural Produce.[cclxxxvii] Hemcore started business in 1993 and now has 80 UK farmers, licensed by the Home Office, under contract. Hemcore introduced hemp fibre into the textile industry in 1994 by producing a 40% hemp 20% cotton and 20% recycled wool blend fabric.[cclxxxviii] Recently, a UK aircraft manufacturer said it was considering Hemcore matting for its fighter planes and gun turrets.[cclxxxix]

United States of America

International Paper has been actively lobbying for hemp to be grown as a domestic crop for papermaking. According to Curtis Koster, manager of business development for International Pulp and Paper, "We would consider kenaf in the short term, because it is legal to grow here in the United States, but in the long term, hemp is a more economical crop". [ccxc] International Paper sent four representatives to participate in the founding session of the North American Industrial Hemp Council in Minneapolis, Minnesota.[ccxci]

Ford Motor Company has recently agreed to substitute Hemcore hemp matting for the fibreglass used in the parcel shelves inside its Transit van.[ccxcii] Ford is planning to use a new reinforced plastic made with hemp in the spoilers on Fiestas and Escorts. Hemp fibres bond with resin in reinforced plastic to form the new material. The plastic is cheaper than conventional glass reinforced materials.[ccxciii]

Kimberley-Clark, a US fortune 500 company, operates a mill in France that produces hemp paper for bibles and cigarettes.[ccxciv]

Bolton-Emerson Americas, Inc. is marketing a pulper that can process and bale 1000 pounds of hemp in ten minutes, 400 tons per day. The product is called the Tornado II.[ccxcv]

Crane Paper has introduced a line of hemp and kenaf blend paper.[ccxcvi]

C&S Specialty Builders Supply, in Harrisburg, Oregon, is making medium-density fibreboard from hemp that is twice as strong as wood and three times more elastic.
In the Spring of 1993 C&S formed a mutual research project with Xylem Inc.
Together they're building the world's first prototype "Xylanizer" biofractionation line.
Biofractionation is the process of reducing plant matter into three basic components: cellulose, hemi-cellulose and lignin. The process is also called steam explosion.[ccxcvii]

Adidas has produced a shoe made of hemp, and the first 20,000 pairs sold under the name "The Hemp".[ccxcviii] The name has changed to "Gazelle II" and it is being mass-produced.[ccxcix]

Calvin Klein introduced hemp/linen duvets and pillow shams in his 1995 C.K. Home Collection, and used 100% hemp in his '96 spring line. Klein predicted that hemp would be "the fibre of choice" for the home-furnishings industry, since most of the mills producing hemp fabrics are geared to heavy-gauge canvas.[ccc]

Cool Runnings has developed a jeep-like electric vehicle with a composite body made of hemp reinforced plastic. The company is now taking orders as part of a limited edition sales, in order to generate capital to start a small scale manufacturing plant. Second generation vehicles should be available for a cost of $15,000.00 each.[ccci]

Masonite USA and Inland Container Corporation have expressed an interest in hemp as an alternative fibre source.[cccii]

Tree Free Eco-Paper of Oregon imports paper manufactured in China. The company is in the process of building a paper mill in Oregon that would create 400 new jobs, but without a domestic hemp supply, raw materials will be imported, keeping prices high.

Giorgio Armani is selling hemp jeans,[ccciii] made from material supplied by Heavytex.[ccciv]

Walt Disney sells hemp hats as part of its Indiana Jones exhibit.

Interface Inc. of Atlanta, a carpet tile manufacturer, is testing hemp as part of company owner Ray Anderson's quest to make all of Interface's products recyclable by 2000.

Crown City Mattress of San Gabriel, CA., is putting hemp into about 3 percent of this year's production of mattresses and futons. Crown City's Vice President Steve Carwile said the product is durable, mold-resistant and appeals to his eco-conscious clientele.[cccv]

Ortex is and has been the largest hemp raw materials importer in the US for 30 years.
Their fabrics include upholstery and apparel, and they have a new rug material up to 4m wide. Other products include industrial and building materials such as fibre board, hemp mat for soundproofing, insulation, and erosion control, as well as hemp based paper and corrugated cardboard, twine, cord, rope, and webbing.[cccvi]

Crescent Mills spins hemp/wool blends and also blends hemp with EcospunTM made from recycled soda bottles by Wellman Industries of Greenville, South Carolina.
Hemp Textiles International Corporation has reintroduced hemp yarn into North American spinning mills, trademarked a brand of fibre called Cantiva TM, and produced yarn in the form of blends named HempCot TM, HempWol TM, and Hemp RePoly TM.

ECONOMIC MERIT OF PRODUCING HEMP

Industry and government have commissioned, financed, and conducted preliminary hemp research in South Africa to investigate the potential economic benefits associated with domestic hemp production. Market research shows good growth potential, and suitable yields have been achieved with EU certified cultivars at multiple locations. Additional EU certified cultivars need to be trialed at multiple locations in South Africa, and locally adapted cultivars need to be developed to extend the growing season and increase hemp's productive capacity. Permits for growing hemp in South Africa are for research purposes only and have not provided for the sale of fibre, hurds, seed, oil, or seed cake. There is an existing market for post harvest material from commercial scale manufacturing trials. Cost recovery mechanisms must be incorporated into research through commercial scale production trials and product development. This will require greater cooperation between the regulatory authorities, the research community, farmers, and local manufacturers.

South Africa can produce hemp for existing domestic and international markets including highly nutritious food and beverage products, panel products, paper products, textiles, composites, animal bedding and feed, fuel, soap, and body care products. Production of hemp in South Africa has the potential to provide jobs, foreign exchange, and offset the increasing trade deficit from imported hemp products.

SOUTH AFRICAN ROLE-PLAYERS & INVESTORS IN HEMP RESEARCH & DEVELOPMENT

Role players who have invested in the research and development of hemp in South Africa include the Agricultural Research Council's Tobacco and Cotton Research Institute, PG Bison,[cccvii] Masonite Africa Ltd.,[cccviii] and the Southern Africa Hemp Company.[cccix] The CSIR, Sensi Thread Clothing Company,[cccx] Berg River Textile Company,[cccxi] and the Western Cape Department of Agriculture are also role-players in South African hemp research and development.

Future investors may include the pulp and paper industry, food and feed industry, textile industry, automotive industry, seed companies, private technology developers, farming associations, and international interests. Government organizations that may invest in the future include the National Department of Agriculture. Mercedes Benz South Africa and the Eastern Cape Agricultural Co-operative have indicated an interest in supporting hemp research and development. The Industrial Development Corporation can provide investment into processing technology and infrastructure. Researchers from the Forestry and Agricultural Biotechnology Institute at the University of Pretoria,[cccxii] and faculty from the University of Natal have expressed interest in conducting hemp research.[cccxiii]

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v Rose, Richard. *Hempseed Foods Overview.* Page 2. Contact Richard Rose via the Hemp Food Association (HFA). Website: http://www.hempfood.com.

vi Spirit of Hanf, Iglaseeg. 72, A-1190 Wien, Austria. Tel: 00431 320 57 58; Fax: 00431 320 57 50; Email: info@spirit-of-hanf.com; Website: http://www.spirit-ofhanf.com. Rapsenergie Kautzen, Bauhofweg 7, A-3851 Kautzen, Austria. Tel: 02864 260 59 15; Fax: 02864 260 59 11. Frederick Brewing Company, 4607 Wedgewood Blvd. Frederick, Maryland 21707 USA. Tel: 888 BLU-RIDG; Fax: 301 694 2971; Email: kevin@fredbrew.com; Website: http://www.fredbrew.com. In cooperation with the Kentucky Hemp Beer Co., the Lexington Brewing Co. has developed a new brew that uses hemp seeds. Bowen Island Brewing Company Produces a Hemp Crème Ale. Humboldt Brewing Company, with breweries in Arcata, Oakland, and San Francisco, CA are producing Humboldt Hemp Ale.

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[xv] House of Representatives, State of Hawaii. *Industrial Hemp - Economic Viability and Political Concerns.* Honolulu, Hawaii. Prepared for: Representative Cynthia Thielen, Minority Floor Leader By: Gertraude Roth-Li, Minority Research Staff, 17 April 1996.

[xvi] Zellform Product Information. See Austria under contacts section of this report.

[xvii] Bigfoot Snowboards of Bellingham, WA, USA.

[xviii] La Chanviere de l'Aubehemp in France markets raw hurds under the trade name Aubiose, as a horse bedding. Leftover hemp particles are moulded into pellets and sold as kitty litter called Biochat in France and All Hugro in Germany. Hemcore of England produces hemp horse bedding.

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[xl] Watson, David and Clarke, Robert. "The Genetic Future of Hemp." In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (Feb. - March, 1997): 122.

[xli] P. Goloborod'ko, Director - Ukraine Institute of Bast Crops. Letter to SAHC. Oct. 1994.

[xlii] GATE-Fleischmann Rudolf Agricultural Research Institute 3356 KOMPOLT (Heves) Hungary. Attn: Prof. Ivan Bocsa. Kompolt (Heves) H-3356 Hungary. Tel: 36 36 489 082; Fax: 36 36 489 000; Email: gatefrki@gateki.ektf.hu.

[xliii] Federation Nationale des Producteurs de Chanvre. 20 Rue Paul Ligneul, Le Mans, France. Tel: +33-24377-0916; Fax: +33-2432-89923.

[xliv] Green Lands Hemp Products. Utrechtsestraat 26, 1017 VN Amsterdam Holland. Tel: 31 20 625 1100; Fax: 31 20 422 1125.

[xlv] Reichert, Gordon. "Government of Canada: Report on Hemp." *Bi-Weekly Bulletin from the Policy Branch of Agriculture and Agri-food Canada Vol. 7:23* (Dec. 16, 1994). For further information contact: Gordon Reichert. Adaption and Grain Policy Directorate PO Box 6200 4th floor, 200 Graham Ave. Winnipeg, Manitoba Canada R3C 4N1. Tel: 204 983-8972.

[xlvi] P. Goloborod'ko, Director - Ukraine Institute of Bast Crops. Letter to SAHC. Oct 1994.

[xlvii] Karus, Michael and Leson, Gero "Opportunities for German Hemp Results of the Hemp Product Line Project." *Journal of the International Hemp Association Vol. 4:1* (1997). nova Institute 1997.

[xlviii] Herald-Leader Editorial Board. "Give Hemp a Chance: Drug Politics Keep us from Testing Economists' Theories." Lexington Herald-Leader Lexington, Kentucky (July 9, 1998).

[xlix] Marcus, David. "Stalk & Seed: the Farm-Gate Price, An Economic Analysis of Dual-Purpose Growing." *Commercial Hemp Vol. 1:1* (winter 1997): 22.

[l] This includes dew retted or water retted stalk, or hand processed fibre.

[li] Reichert, Gordon. "Government of Canada: Report on Hemp." *Bi-Weekly Bulletin from the Policy Branch of Agriculture and Agri-food Canada Vol. 7:23* (Dec. 16, 1994). For further information contact: Gordon Reichert. Adaption and Grain Policy Directorate PO Box 6200 4th floor, 200 Graham Ave. Winnipeg, Manitoba Canada R3C 4N1. Tel: 204 983-8972.

[lii] P. Goloborod'ko, Director - Ukraine Institute of Bast Crops. Letter to SAHC. Oct 1994.

[liii] Karus, Michael and Leson, Gero "Opportunities for German Hemp Results of the Hemp Product Line Project." *Journal of the International Hemp Association Vol. 4:1* (1997). Nova Institute 1997, based on EU statistics.

[liv] Farmers will get CN$400 an acre on or before 31 October, with the remainder being paid in one-third increments on 15 January, 15 April, and 15 August.

[lv] Kenex will pay CN$0.50 cents a pound for clean grain at 10 percent moisture. Kenex will pay drying costs this year.

[lvi] Ontario Farmer. "Hemp: Southwestern Farmers Ponder Economics of Hemp Contracts." Ontario Farmer (March 10, 1998).

[lvii] Website: http://www.iagi.com/fiber.html. 24/05/98.

[lviii] Marcus, David. "Stalk & Seed: the Farm-Gate Price, An Economic Analysis of Dual-Purpose Growing." *Commercial Hemp Vol. 1:1* (winter 1997): 22.

[lix] Roulac, John. *Industrial Hemp.* Hemptech. Ojai, CA, 1995. Page 22.

[lx] Mole, Matthew C.; Halbrendt, Catherine Chan; Wang, Qingbin; Kolodinsky, Jane. "Willingness to Pay for Hemp Based Products: Evidence from a Consumer Survey." Department of Community Development and Applied Economics, 102B Morrill Hall, The University of Vermont, Burlington, VT 05405-0106. Tel (802) 656-1022. Fax: (802) 656-1423; Email: mmole@zoo.uvm.edu. In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (27 Feb. - 2 March, 1997): 552.

[lxi] Mole, Matthew C.; Halbrendt, Catherine Chan; Wang, Qingbin; Kolodinsky, Jane. "Willingness to Pay for Hemp Based Products: Evidence from a Consumer Survey." Department of Community Development and Applied Economics, 102B Morrill Hall, The University of Vermont, Burlington, VT 05405-0106. Tel (802) 656-1022. Fax: (802) 656-1423 Email: mmole@zoo.uvm.edu. In *Proceedings of*

the Second International BioResourcce Hemp Symposium. Frankfurt, Germany (27 Feb. - 2 March, 1997): 544.

[lxii] Ken Friedman, President of the Hemp Industries Association.

[lxiii] Thompson, Dr. Eric C.; Berger, Dr. Mark C. and Allen, Steven N. *Economic Impact of Industrial Hemp in Kentucky*. University of Kentucky's Carol Martin Gatton College of Business and Economics. July, 1988.

[lxiv] Karus, Michael and Leson, Gero "Opportunities for German Hemp Results of the 'Hemp Product Line Project." *Journal of the International Hemp Association Vol. 4:1* (1997). nova Institute 1997.

[lxv] Steba Ltd. H-1173 Kaszalo u 139, Budapest, Hungary. Tel:(36-1)-257-2745; Fax: (36-1)-256-9802.

[lxvi] Naturetex International B.V. Van Diemenstraat 192, 1013 CP Amsterdam, The Netherlands. Tel: 31 (0) 20 420 30 40; Fax: 31 (0) 20 420 35 45.

[lxvii] Hemp Textiles International. 3200 30th Street Bellingham, WA 98225 Tel: 360 650 164; Fax: 360 650 0523. Orders 1-800-778-Hemp.

[lxviii] ReSource Trim & Notions. 350 Townsend, Suite 422, San Francisco, CA 94107. Tel: 415-777-6970; Fax: 415-777-6979.

[lxix] Guangzhou Foreign Trade Baiyun Corporation. 4/F East Tower No. 1372 GuangYuan Zhong Road GuangZhou, China. Tel: 020-86579916; Fax: 020-86579914; E-mail: gzcnbycm@public1.guangzhou.gd.cn; Web Site: ftby-cn.asiaep.com.

[lxx] The Ohio Hempery, Inc. 7002 State Route 329 Guysville, Ohio USA 45735 Tel: 614-662-4367; Fax: 614-662-6446. Orders 1-800-BUY-HEMP. Website: http://www.hempery.com.

[lxxi] Hemp Traders. 2130 Colby Ave. #1, Los Angeles, CA 90025. Tel: 310-914-9557; Fax 310-478-2108

[lxxii] Cannabest. 1536 Monterey Street, San Luis Obispo, CA 93401. Tel: 1-800-277-0510.

[lxxiii] Green Lands Hemp Products. Utrechtsestraat 26, 1017 VN Amsterdam Holland. Tel: 31 20 625 1100; Fax: 31 20 422 1125.

[lxxiv] Dupetit, Hauptstrabe 41, D 63930 Richelbach. Tel: +49 9378 99590; Fax: +49 9378 394.

[lxxv] Vermont Hemp Company. PO Box 5233, Burlington, Vermont 05401. Tel: 802-865-2646.

[lxxvi] Louie, Elaine. "Cannabis Beer? Not What You Think." New York Times. 15 April 1998.

[lxxvii] A 12-ounce bottle of Hempen Ale costs 99 cents at Pioneer Supermarket, 289 Columbus Avenue (near 74th Street); $1.59 at Strawberry Fields, 311 Bleecker Street (near Grove Street); and $1.75 at Lexington Avenue Market, 859 Lexington Avenue (near 65th Street).

[lxxviii] Industrial AG Innovations. 2725 North Westwood Blvd. Suite 7. Poplar Bluff, MO 63901 USA. Email: iagi@pbmo.net.

[lxxix] Leson, Gero. "Pulp and Paper from Hemp." In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (Feb. - March, 1997): 424.

[lxxx] Roekel, Gertjan van. "Bulk Papermaking Applications for Bast Fibre Crops Using Extrusion Pulping." In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (Feb. - March, 1997): 427.

[lxxxi] There is an existing market in South Africa for cannabis medicines made from high THC cannabis cultivars, or dagga. Tannie Elsie van Zyl of Underburg makes and supplies cannabis medicine in South Africa, and she reportedly gets her supply of raw cannabis from the Dept. of Health. She has treated thousands of patients, and her customers have included Dr. Mangosuthu Buthelezi and former Prime Minister John Vorster. Tannie Elsie van Zyl has kept a registry of her patients since 1993.

Much of the research literature on medicinal applications of cannabis explores the therapeutic attributes of THC and high THC cannabis cultivars. In the late 19th century, cannabis was used in dozens of remedies available over the counter or by prescription. Among these products were the stomachic Chlorodyne, and Corn Collodium, made by Squibb Company. Parke-Davis made Casadein, Ultroval, and Veterinary Colic Medicine, and Eli Lilly produced Dr. Brown's Sedative Tablets, Syrup Tolu Compound, Syrup Lobelia, Neurosine, and One Day Cough Cure. The company of Grimault and Sons marketed cannabis cigarettes as a remedy for asthma. (Robinson, Rowan. *The Great Book of Hemp.* Park Street Press. Rochester, Vermont, 1996. Website: http://www.gotoit.com.) THC is currently approved as an oral prescription drug for the treatment of the nausea and vomiting associated with cancer chemotherapy and for appetite stimulation in cases of the anorexia associated with AIDS. THC is marketed internationally by pharmaceutical companies under the trade name Marinol, or generically as Dronabinol. Marinol ranges between $4 and $8 per dose, and the average patient cost is from $12 to $32 per day. This synthetic THC is encapsulated in sesame oil and sold as a schedule II controlled substance in the US, allowing for restricted prescription. An article in the January 1998 issue of Arthritis & Rheumatism describes the anti-inflammatory

effects noted in pre-clinical experiments using CT-3, a proprietary lead compound of Atlantic Pharmaceuticals, Inc. "The CT-3 experiments modeled both chronic inflammation, such as occurs in rheumatoid arthritis, and acute inflammation, such as results from sprained joints. In each case, CT-3 substantially reduced inflammation at very low oral doses. The article notes that the compound also prevented the destruction of joint tissues that typically result from chronic inflammation. CT-3 is a non-psychoactive synthetic derivative of a metabolite of tetrahydrocannabinol (THC), a psychoactive compound found in cannabis (marijuana). The reported research was directed by University of Massachusetts Professor of Medicine Robert B. Zurier, M.D., the lead author of the article in Arthritis & Rheumatism, a monthly peer-review journal published by the American College of Rheumatology. Other medicines derived from cannabis include Canasol, used in the treatment of glaucoma; and Asmasol, used as a children's asthma syrup. These medicines have been developed by M.E.West of the Department of Pharmacology at the University of the West Indies. Canasol has shown a marked effect on interocular pressure, and significant improvement in night vision. Both Canasol, and Asmasol have been reported to be safe, effective, and popular, and have been praised for saving countries like Jamaica a fortune in foreign exchange needed to import drugs from overseas. A homeopathic medicine made from cannabis is marketed in the Netherlands by VSM. In the Netherlands, medical marijuana can be prescribed by doctors and purchased, with a prescription, through the Stichting Institute of Medical Marijuana. The institute grows the marijuana biologically at its clinic, without the use of insecticides, and tests the levels of THC. A 1990 Harvard University survey of members of the American Society of Clinical Oncology reported that 44 percent of the 1035 respondents said they had recommended the illegal use of cannabis to at least one patient undergoing chemotherapy for cancer. The Times of London reported in 1994 that "the demand for cannabis among British pensioners has stunned doctors, police and suppliers….the old people use the drug to ease the pain of such aliments as arthritis and rheumatism." Patients claim there is an acute need to reform laws concerning cannabis products, especially in response to the medical plight of thousands of cancer and AIDS patients. Governor Bruce Babbitt of the state of Arizona in the United States signed a bill in 1983 to provide for taxing of the sale of marijuana in the state. In a subsequent twelve year period, sixty seven licenses were sold and $300,000 was generated. The state Department of Revenue lists a figure of $37 million in cannabis taxes still outstanding.

[lxxxii] Cunha, J.M.; Carlini, E.A.; and Pereira. "Chronic Administration of CBD to Healthy Volunteers and Epileptic Patients." *Pharmacology Vol. 21* (1980): 175-185; and Ames, F.R. and Crinland, S. "Anticonvulsant Effect of Cannabidiol." *South African Medical Journal Vol. 69:14* (1986).

[lxxxiii] Consroe. "Open Label Evaluation of Cannabidiol in Dystonic Movement Disorders." *International Journal of Neuroscience Vol. 30* (1986): 277-282; and Sandyk, R. "Cannabidiol in Dystonic Movement Disorders." *Psychiatry Research Vol. 18* (1986): 291.

[lxxxiv] Formukong, Evans, and Evans. "Analgesic and Anti-inflamatory Activity of Constituents of Cannabis sativa L." *Inflammation Vol.12: 4* (1988): 361-371.

[lxxxv] Carlini, E.A. and Cunha, J.A. "Hypnotic and Anti-epileptic Effects of CBD." *Journal of Clinical Pharmacology Vol. 21* (1981): 417S-427S.

[lxxxvi] Consroe. "Open Label Evaluation of Cannabidiol in Dystonic Movement Disorders." *International Journal of Neuroscience Vol. 30* (1986): 277-282.

[lxxxvii] Sandyk and Awerbuch. "Marijuana and Tourette's Syndome." *Journal of Clinical Psycho Pharmacology. Vol. 8* (1988): 444-445; Conti, Johannesen, Musty, & Consroe. Anti-dyskinetic Effects of CBD." *Proceedings of the International Conference on Marijuana*. Melbourne, Australia, 1987.

[lxxxviii] Report in the 7 July issue of the Proceedings of the National Academy of Sciences. "Substance in Dagga Aids Brain Cells." The Citizen 8 July 1998: 18.

[lxxxix] Tim Mclean, Mclean Textile Company. Tel: 021 511 7695; Cell: 082 7722 111

[xc] Hemporium, Attn; Alistair Mclean. Cell: 082 565 8904; Fax: 021 511 7664; Email alistair@hemporium.co.za.

[xci] Irie Hemp, retailers and wholesalers of 100% hemp. 77A 3rd Ave., Melville 2092. Tel: 011 482 4231; Fax: 011 958 4592 Email: iriehemp@icon.co.za; Website: http://www.icon.co.za/~matium.

[xcii] The Hemp Shop, Attn: Renee and Rolf Wurr. Tel: 021 23 3398; Tel/Fax: 021 24 8691.

[xciii] Michael and Carin, Sensi Thread. Tel: 021 543 365; Fax: 021 548 327; Email: cadema@aztec.co.za.

[xciv] Tessa Sonik Fabric Collection. PO Box 1333 Highlands North 2037. Tel: 442-3409; Fax: 442 3448; Cell: 082-553 8515.

[xcv] Personal Email communication from Kunene Thandeka. Email: f909198@grad.richmond.ac.uk.

[xcvi] Rustenburg Building Materials. Rustenburg, Northwest Province.

[xcvii] Green Leaf Africa. Atn: Jenine Deverneuil. Tel: 011 913 3589; Fax: 914 3099.

Email: glafrika@global.co.za.

[xcviii] Personal Communication: Jenine Deverneuil.

[xcix] Cansat Agency. Attn: Phil Joubert. Tel: 083 301 33239; Fax: 083 8301 3239.

[c] Personnal communication with Jenine Deverneuil. Tel: 011 913 3589. 20 July 1998.

[ci] Kashgar CC Rugs Coir Flooring. Importer: Graham Dunbar. Tel: 011 618 1830; Fax: 011 618 1955.

[cii] Mondi Kraft division has an annual production capacity of 450,000 tons of kraft pulp and 380,000 tons of kraftliner and fluting. Mondi Cartonboard has an overall capacity of 160,000 tons per year. SilvaCel exports about 800,000 tons of hardwood chips to customers in the Far East. Sappi Southern Africa owns and manages 420,000 hectares of timber plantations in southern Africa, which supply approximately 50% of its domestic wood requirements. Sappi Southern Africa is a fully integrated pulp and paper manufacturer with a capacity of 1.2 million tons of bleached and unbleached paper pulp. PG Bison uses195,000 tons of dry fibre per year to manufacture particleboard and chipboard. Masonite Africa Ltd. uses about 120,000 tons of dry fibre per year.

[ciii] Reichert, Gordon. "Government of Canada: Report on Hemp." *Bi-Weekly Bulletin from the Policy Branch of Agriculture and Agri-food Canada Vol. 7:23* (16 Dec. 1994). For further information contact: Gordon Reichert Adaption and Grain Policy Directorate PO Box 6200 4th floor, 200 Graham Ave. Winnipeg, Manitoba Canada R3C 4N1. Tel: 204 983 8972.

[civ] Low, Ian. "UK Hemp Production." In *Proceedings: BioResource Hemp Symposium.* Frankfurt, Germany, (1995): 48.

[cv] Watson, David and Clarke, Robert. "The Genetic Future of Hemp." In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (Feb. - March, 1997): 122.

[cvi] Reichert, Gordon. "Government of Canada: Report on Hemp." *Bi-Weekly Bulletin from the Policy Branch of Agriculture and Agri-food Canada Vol. 7:23* (16 Dec. 1994). For further information contact: Gordon Reichert (204) 983-8972. Adaption and Grain Policy Directorate PO Box 6200 4th floor, 200 Graham Ave. Winnipeg, Manitoba Canada R3C 4N1.

[cvii] Watson, David and Clarke, Robert. "The Genetic Future of Hemp." In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (Feb. - March, 1997): 122.

[cviii] Retting is natural process of decomposition.

[cix] Reichert, Gordon. "Government of Canada: Report on Hemp."

[cx] Silsoe Research Institute, Wrest Park, Silsoe, Bedford, MK45 4HS, U.K.

[cxi] House of Representatives, State of Hawaii. *Industrial Hemp - Economic Viability and Political Concerns.* Honolulu, Hawaii. Prepared for: Representative Cynthia Thielen, Minority Floor Leader By: Gertraude Roth-Li, Minority Research Staff, 17 April 1996.

[cxii] The Sunday London Times "Ford Uses Hemp to Make New Plastic for Cars." (25 Aug. 1997).

[cxiii] Shamai, Ruth. "O Canada, What's with Our Native Land?" *HempWorld* (fall 1996): 30-31.

[cxiv] Hill Agra Sales R.R.3 Shelburne, Otario, Canada LON 1S7. Fax: (519) 925 6441. Email: hillagra@headwaters.com; Website: http://www.headwaters.com/hillagra/.

[cxv] Sperling, Petra. "Euro Bits." *HempWorld* (summer 1997): 12.

[cxvi] K.D. KloB, ECCO Gleittechnik GmbH, Seeshaupt, Germany. *HempWorld* (fall 1997): 12.

[cxvii] Leson, Gero. "Pulp and Paper from Hemp." In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (Feb. - March, 1997): 424.

[cxviii] Roekel, Gertjan van. "Bulk Papermaking Applications for Bast Fibre Crops Using Extrusion Pulping." In *Proceedings of the Second International BioResourcce Hemp Symposium.* Frankfurt, Germany (Feb. - March, 1997): 427.

[cxix] V. Krotov, Ukrainian Pulp & Paper Research Institute, Kiev, Ukraine. In *HempWorld* (fall 1997): 12.

[cxx] Tornado II and Claflin are available for demonstration and trials at the Herty Foundation, Savannah, GA to document performance and provide fiber and sheet samples, as well as quantitative evaluation of product physical and appearance characteristics. Bolton-Emerson Americas, Inc. 9 Osgood St. Lawrence, MA 01842. Tel: 508-686-3961; Fax: 508-688-8225.

[cxxi] Riddlestone, Susan. "Back to the Future for a Profitable New Industry." *Pulp and Paper International* (November 1994): 50-51.

[cxxii] Marcus, David. "Stalk & Seed: the Farm-Gate Price, An Economic Analysis of Dual-Purpose Growing." *Commercial Hemp Vol. 1:1* (winter 1997): 22.

[cxxiii] Kynaston, Matthew. "Why Pulp Hemp?" *Commercial Hemp Vol. 1:1* (winter 1997): 17.

[cxxiv] Reichert, Gordon. "Government of Canada: Report on Hemp." *Bi-Weekly Bulletin. Vol. 7:23*

(16 Dec. 1994). Reproduced in *HempWorld* (June/July 1995): 43-44.

[cxxv] In 1961, the Canadian Narcotics Control Act (CNCA) allowed Cannabis to be grown, at the discretion of the Health Minister, for research purposes only. Reichert, Gordon. "Government of Canada: Report on Hemp." *Bi-Weekly Bulletin Vol. 7 No. 23* (16 Dec. 1994). Hemperor@mbnet.mb.ca.

[cxxvi] Agricultural Hemp Association Voter. PO Box 8671. Denver, CO 80201 USA. Tel: 303 298 9414; Email: ahavoter@aol..com.

[cxxvii] U.K. sowing and harvesting declarations for subsidy are processed by the Intervention Board for Agricultural Produce. Missouri Hemp Production Act of 1997. Vermont Bill 1576 of 1997. Hawaii House Bill No. 55 of 1997. In 1980 it was reported that French farmers were required to contact both the Department of Health and the Department of Agriculture of intent to plant hemp.

[cxxviii] In 1980 it was reported that French farmers were required to contact both the Department of Health and the Department of Agriculture of intent to plant hemp. Canadian licences for the cultivation, importation, exportation, distribution, conditioning or processing of hemp can be obtained through Health Canada's web site. http://www.hc-sc.gc.ca/hpb-dgps/therapeut/drhtmeng/hemp.html.

[cxxix] Vermont Bill 1576 of 1997 proposes a $10/acre licensing fee.

[cxxx] Maylon, Tim. "No Marijuana: Plenty of Hemp." *New Scientist* (13 November 1980): 435.

[cxxxi] U.K Home Office Licence No. 94/CC/822; File No. DDA/3468/1/1.

[cxxxii] Hawaii House Bill No. 55 of 1997 proposed a fee based on total acreage to be cultivated.

[cxxxiii] U.K Home Office Licence No. 94/CC/822; File No. DDA/3468/1/1; Maylon, Tim. "No Marijuana: Plenty of Hemp." *New Scientist* (13 November 1980): 435.

[cxxxiv] Missouri Hemp Production Act of 1997. Hawaii House Bill No. 55 of 1997.

[cxxxv] EEU limits, as well as Canadian limits are set at 0.3% THC. State legislation proposing levels to be set at1.0% THC includes: New Hampshire 1997, Virginia 1997, Iowa,

[cxxxvi] U.K Home Office Licence No. 94/CC/822; File No. DDA/3468/1/1.

[cxxxvii] U.K Home Office Licence No. 94/CC/822; File No. DDA/3468/1/1.

[cxxxviii] U.K Home Office Licence No. 94/CC/822; File No. DDA/3468/1/1.

[cxxxix] Colorado Farm Bureau Resolution 1996. Iowa Hemp Bill. Virginia Joint resolution No. 656.

[cxl] THC levels proposed in Hawaii House Bill No. 55 of 1997.

[cxli] A 60 page report urging the government of New Zealand to rapidly change legislation prohibiting hemp production was released in March of 1998. The 60-page report was commissioned by the National Community Employment Group. An economic analysis of growing industrial hemp will subsequently be presented to parliamentarians by lobbyists seeking the legalisation of industrial cannabis sativa - a variety low in THC, the active ingredient in marijuana. The presentation follows last month's recommendation from a top Health Ministry official to lift the ban on commercial cannabis cultivation to allow trials of industrial hemp production. Bob Boyd, the ministry's chief adviser on regulation and safety, sees no reason for the ministry to "stand in the way of entrepreneurs wanting new business opportunities." Rotherham, Fiona. "Lobby Pushes Pot as Tomorrow's Eco-crop." (3 June 1998).

[cxlii] UN Single Convention Treaty on Narcotic Drugs (Article 28, Sec. 2, 1961).

[cxliii] Council Regulation (EEC) No. 3698/88 of 24 November 1988 laying down special measures for hemp seed. Official Journal of the European Communities L 325 Vol. 31, 29 Nov. 1988.

[cxliv] Council Regulation (EEC) No. 1164/89 of 28 April 1989 laying down detailed rules concerning the aid for fibre flax and hemp.

[cxlv] Section 37(1) of the Misuse of Drugs Act 1971. Amended by Section 52 of the Criminal Law Act 1977.

[cxlvi] Controlled Substances Act, Food & Drug Administration. (1970) 21 USC 802-15. Also see Custom Regulations of the United States, Official US Custom House Guide, 1987. Sec. 302.58--CR-360 Marijuana Statutory Provisions.

[cxlvii] Bill C-7, the Controlled Drugs and Substances Act was introduced before the Canadian Parliament on Feb. 2, 1994 by the Ministers of Health and Justice to bring Canadian law in line with international accords to which the country is party. Update on Regulations for the Cultivation of Industrial Hemp: Revised August 28, 1997. The Controlled Drugs and Substances Act (CDSA) was passed by Parliament and received Royal Assent on June 20, 1996. On April 21, 1997, by Order-in-Council, the Controlled Drugs and Substances Act was proclaimed and came into force effective May 14, 1997. As a result, the Narcotic Control Act and Parts III and IV of the Food and Drugs Act are repealed. By virtue of subsection 44(g) of the Interpretations Act, the current Narcotic Control Regulations, the Controlled Drugs Regulations and the Restricted Drugs Regulations are now deemed to have been made under the Controlled Drugs and

Substances Act and remain in force. Copies of the Controlled Drugs and Substances Act are available from: Canada Communications Group. Ottawa, Ontario KlA 0S9. Tel: 613 956 4802.

[cxlviii] Cheves, John. "Kentucky Farmers Filing Suit in Attempt to Legalize Hemp." Herald-Leader. Lexington, Kentucky, (15 May 1998).

[128] Hopkinton Representative and farmer Derek Owen filed a lawsuit against the US Drug Enforcement Agency, calling for lifting of restrictions on the production of hemp. The New Hampshire Hemp Council of Keene is joining Owen in his lawsuit filed in US District Court on 30 April, 1998.

[cl] See Below: Colorado, Iowa, Kentucky, Minnesota, Missouri, New Hampshire, North Dakota, Vermont, and Virginia.

[cli] Colorado Industrial Hemp Production Act, Senate Bill 67 was introduced in 1996 by Senator Lloyd Casey and co-sponsored in the House by Rep. Steve Acquafresca and Bill Jerke. Legislator Kay Alexander said she would introduce similar legislation in 1997 to encourage research on three bast crops; hemp, kenaf, and sun hemp. Research proposed to remove high THC from hemp cultivars.

[clii] Hawaii House Bill No. 55 of 1997 proposed to permit the development of low THC hemp cultivars and amend the definition of marijuana in Hawaii revised statutes to permit hemp production. In Feb of 1997, Hawaii House Bill 284 was introduced which called for the University of Hawaii to conduct research on seed production and fibre quality. This legislation also proposed the establishment of a hemp research regulation committee to research commercial hemp regulation policies in other countries and make recommendations for similar practices in Hawaii.

[cliii] Iowa Industrial Hemp Bill calls for the Iowa State University to conduct research, to be completed not later than Jan. 15, 1999, regarding the production and marketing of hemp. http://www2.legis.state.ia.us/GA/77GA/Legislation/HF/00400/HF0042/970228.html.

[cliv] Kansas Senator David Corbin drafted, sponsored and was reported to introduce Industrial Hemp Senate Bill SCR1605 on Monday, February 3, 1997 in the Senate Agriculture Committee.

[clv] Kentucky Sen. Barry Metcalf, filed a bill in 1997 directing the University of Kentucky to conduct research on hemp. Source: Lawson, Gil. "Sides Debate Legalizing Crop That Resembles Marijuana." *The Courier Journal Louisville*, Kentucky, 10 July 1997. Hemp legislation has been drafted for the 1998 session and is sponsored by Kentucky Senator Barry Metcalf. State Capital Annex. Frankfurt. KY 40601. Tel: 502 564 8100; or 800 372 7181; Office: 606 624 8387.

[clvi] Minnesota Governor Arne Carlson vetoed hemp legislation in April of 1998 that had passed the Senate by a vote of 59-1 and the House by a vote of 68-64. The bill would have authorised filed trials at the University of Minnesota to study agricultural practices for reintroducing hemp into the state.

[clvii] Missouri Hemp Production Act of 1997 Senate Bill No. 79, 89th General Assembly was introduced by Senator Jerry T. Howard to call for regulation of hemp production. This legislation proposes to appropriate $50,000 to a higher education institution to conduct research on commercial uses of industrial hemp. Companion, House Bill 283, was introduced on 27 Jan. by Representative Larry Thomason. Source: Hempseed. Email: webmaster@hempseed.com.

[clviii] New Hampshire Bill 1576 was sponsored by Tim Robertson of Keene in December of 1997. This legislation creates a licensing and regulatory apparatus to be stewarded by the State Department of Agriculture, and encourages University Agricultural School to work with growers.

[clix] New Mexico Hemp Bill #222 was sponsored by Representative G.X. McSherry (Route 2, Box 138, Deming, NM 88030, 505-546-8086) in 1998, which passed both the House and the Senate, and provides $50,000 for the New Mexico Department of Agriculture to plant hemp. Due to over expenditures in the budget, the bill did not make it to the Governor's desk for approval.

[clx] North Dakota House of Representatives voted 58-30 to require North Dakota State University's agricultural experiment station to research the potential of hemp. The study, expected to cost $75,000, is to include an analysis of possible markets, soil and growing conditions, seed availability and police concerns.

[clxi] Vermont General Assembly enacted Act. No. 176 in 1996, which directed the University of Vermont to investigate the viability of hemp. On Agricultural Day, March 20, 1998, The Committee on Agriculture introduced Joint House Resolution 149 that urging the Federal Drug Enforcement Admnistration to review the procedures under which their Canadian counterparts are authorized to sanction the commercial development of hemp. The resolution recommended to the President and Congress of the United States that the federal government adopt the necessary statutes and regulations to permit the production of hemp in the United States.

[clxii] Virginia introduced House Joint Resolution No. 656 in Jan. 1997 to fund a study of hemp. Source: Hempseed. Email: webmaster@hempseed.com.

[clxiii] State of Alaska Initiative Petition – An Act to Re-legalize Hemp.

[clxiv] The Campaign for the Restoration and Regulation of Hemp (CRRH), an Oregon political action committee, is circulating a state-wide initiative petition, the Oregon Cannabis Tax Act (OCTA), to take effect on January 1, 1999. OCTA would allow the production of hemp fibre, protein and oil, allow doctors to prescribe cannabis to patients at cost and regulate the sale of cannabis drugs to adults in the state of Oregon. This Act could raise hundreds of millions of dollars in state revenue by taxing sales to adults.

[clxv] Grenda, Tim. "Industrial Hemp Initiative underway in California." Los Angeles Times (3 March 1998). Website: http://www.latimes.com. (Introduced by Californians for Industrial Renewal).

[clxvi] Department of Health and Welfare. Application to Acquire any Schedule Drugs for Analytical Research. In terms of the provisions of section 22A, sections (7) (e), (8) (g), (9) (g) and (10) of the Medicines and Related Substances Control Act 101 of 1965.

[clxvii] Application for a Permit to Import Narcotic Drugs and/or Psychotropic Substances in Terms of the Medicines and Related Substances Control Act 101 of 1965: The Single Convention on Narcotic Drugs, 1961, and the Convention on Psychotropic Substances, 1971.

[clxviii] Directorate of Plant and Quality Control. Private Bag X258, Pretoria, 0001. Application for a Permit for the Importation of Controlled Goods in Terms of the Provisions of the Agricultural Pest Act No. 36 of 1983. Must be completed and submitted 30 days prior to the arrival of goods into SA.

[clxix] This Act makes provision for control over the utilization of the natural agricultural resources of SA in order to promote the conservation of the soil, the water resources and the vegetation. This includes the control of weeds and invader plants. Exemptions apply for establishments registered in terms of the Plant Improvement Act, 1976 (Act No. 53 of 1976). Regulations governing the control of weed and invader plants and the list of declared weeds and declared invader plants appear in the Government Gazette No. 9238 of 25 May 1984, on which date the Act also came into operation (Proclamation by the State President of RSA No. 74, 1984). Source: Henderson, Mayda; Fourie, DMC; Wells, MJ and Henderson, L. *Declared Weeds and Alien Invader Plants in South Africa.* Bulletin 413 Republic of South Africa. Botanical Research Institute, 1987.

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[clxxi] South African importers of hemp products specifically questioned about the import taxing and various duties imposed on the importation of hemp products provided the following: Duties being paid on twine are 22% of the value of the imported product, whereas duties being paid on hemp oil range from 0, to 10% depending on the importer, and fabric is reportedly being imported duty free.

[clxxii] Recommendations for the Department of Agriculture and the Department of Health Concerning the Regulation and Production of Hemp in South Africa. Prepared by the Interim Task Team on Bast Crops. 11 June 1998.

Background:

Hemp is recognised as a valid agricultural crop by a 1961 United Nations Single Convention Treaty, as well as recent NAFTA and GATT trade agreements.

Hemp, defined as low-THC cannabis grown exclusively for seed and fibre production, is a well-established agricultural crop that has been grown for thousands of years in many countries around the world. The production of hemp declined with the advent of modern petro-chemical industries and manufacturing processes that promoted the utilisation of synthetic fibres onto the market.

Hemp is currently grown under licence in over 25 countries such as the U.K., Germany, and Canada, which maintain strict control of controlled substances and prohibit the cultivation of marijuana.

Multiple Uses of Hemp:

Hemp has long been cultivated for fibre used in the production of paper, textiles, and rope; and for seed and seed oil used as food, animal feed, and fuel. Hemp fibre is still being used in the production of pulp and paper, textiles, and cordage. Hemp fibre is being used increasingly to manufacture a range of new products including glass fibre replacements for automotive components, fibreboard, home insulation, animal bedding, and as a biomass fuel for electrical power generation. Current and expanding markets for the seed include food and beverage products, feeds, soaps, cosmetics, and body-care products.

Advantages of Hemp:

Hemp has many specific advantages as an agricultural crop including its ability to provide a annual economic returns for farmers who produce fibre for South African industry. Hemp can be grown in rotation with food crops, so that those who supply fibre to industry can produce food and animal feed on the same land, which is difficult to do when growing eucalyptus and pine.

- Hemp can augment the use of wood fibre, which is expected to exceed future domestic supply.
- Hemp can be grown in rotation with crops such as wheat and sugar beet, and has been found to naturally suppress weeds and insect pests, which can reduce chemical inputs, runoff and costs.
- Hemp is being investigated in other countries as a replacement crop for tobacco, which has an uncertain future due to health concerns.
- Domestically produced hemp can augment the industrial use of sisal and other bast fibres which, are currently being imported into South Africa.

Hemp Research in South Africa:
Hemp has currently been grown for research purposes under license from the South African Department of Health since 1994. Hemp seed is imported under permit from the Department of Health and the Department of Agriculture for research purposes only. Trial results with European certified cultivars have been satisfactory. Hemp cultivars currently under development by South African industry show added promise for domestic production and manufacture. South African hemp research and development has reached a point where it needs closer communication and supervision from the Department of Health and the Department of Agriculture.

Industry Involvement:
South African industry has recently formed a cluster to investigate the potential for the domestic production and processing of crops such as hemp and flax. Several research projects have recently invested in the research and development of hemp as a crop for South African farmers. Representatives from industry and the research community have formed the Southern African Bast Crops Consortium to commission and finance the research and development of hemp and other bast crops such as flax, kenaf and sun hemp.

Current Administrative Co-operation:
The Department of Health, upon instruction from the Minister of Agriculture and the Minister of Health, and with the approval of the Medicines Control Council, must be prepared to transfer authority to the Department of Agriculture for permitting of research using European Union (EU) certified hemp cultivars. Research with hemp cultivars not currently certified by the EU must remain under the supervision and regulation of the Department of Health. Importation of cannabis seed not certified by the EU must remain under the supervision of the Department of Health and the Department of Agriculture. The Department of Agriculture has the monitoring capacity to administer to the permitting of agronomic research with EEU certified hemp cultivars and their products. The Department of Agriculture already monitors and permits the importation of all cannabis seed.

Medium Term Policy Development:
As provincial and national legislative resolutions call for a lifting of restrictions on hemp commerce, a research committee must commence to develop recommendations for amending existing legislation in order to make a distinction between certified low-THC hemp, and higher THC cannabis cultivars.
Department of Agriculture must establish detailed parameters for monitoring the importation, research, manufacturing, and export of hemp products. The Department of Agriculture needs to review the status of cannabis as a declared weed. The Department of Agriculture needs to research and test low cost methods for the field testing of cannabis to determine THC levels in hemp crops.

Long Term Policy Development:
As legislation is amended, and as parameters are established by the Department of Agriculture for monitoring the importation, research, and manufacturing and export of hemp products, a manifest system of licensing can be introduced whereby farmers and manufacturers pay a licensing fee based on the size of their crop. This will provide the Department of Agriculture with the resources to field monitor commercial cultivation of hemp for South African farmers.

[clxxiii] South African Hemp Research and Development Bill of 1998

Introduced to provide support for the research and development of hemp for South African agriculture and industry, and to provide for the development of regulatory policy that will enable South African farmers to produce hemp, defined as low-THC cannabis cultivars grown exclusively for seed and fibre production
Whereas,
A 1961 UN Single Convention Treaty on Narcotic Drugs recognizes hemp as a valid agricultural crop, as well as recent NAFTA and GATT trade agreements. And hemp is produced in over 25 countries that maintain strict control of controlled substances.
Whereas,
There is increasing application of hemp in products that utilise wood and glass fibre such as paper, textiles, fibreboard and other panel products, composites and components in automotive manufacture, health care products, as well as food and beverage products.
Whereas**,**
There is a growing interest in the potential for hemp and other bast crops to play a role in diversifying farm income opportunities and augmenting the future supply of wood fibre to meet industry needs.
Whereas**,**
A 1996 White Paper entitled "Sustainable Forest Development in South Africa" reported that domestic supply of wood fiber could fall short of demand in the next 20 years; and advised the South African government to develop alternative fibre resources, and provide support for farmers and entrepreneurs by introducing incentives and minimizing barriers.
Whereas,
Minister of Water Affairs and Forestry Kader Asmal, has asked the pulp and paper industry to recognise the potential of alternative fibre crops such as hemp to both increase pulp volumes and accelerate local economic development.
Whereas,
Bast crops have been evaluated in several countries as a replacement crop for tobacco, which has an uncertain future due to health concerns.
Whereas,
Funding is needed for research and development of hemp and other bast crops in order to introduce these strategic resources into Southern African agriculture and industry.
Whereas,
South African industry and research institutions have invested in feasibility research regarding the cultivation and utilization of bast crops, and have requested a supply of hemp fibre for manufacturing trials.

Therefore be it resolved that we support the research and development of a hemp in the interest of economic development as long as it does not interfere with the strict control of controlled substances.
We agree that South African farmers should eventually be permitted to grow hemp under a simple regulatory system no more restrictive than that of Canada. We support efforts by the Department of Agriculture to coordinate meetings of industry, government, research institutions, farming organizations, and funding institutions to investigate the potential of hemp and other bast crops for South Africa. We recommend that the Department of Agriculture provide support for agricultural trails and assist farmers and the public and private sector with hemp research initiatives. We recommend that a committee be established to investigate regulatory policy of hemp producing countries and advise the government of South Africa on how to adopt the necessary statutes and regulations that would permit similar policies in South Africa. We recommend that this committee may be awarded up to R50,000 in order to conduct research into the regulatory precedents relating to commercial hemp production. We further recommend that the committee be composed of at least five members appointed by the Minister of Agriculture and the Minister of Health.

<u>Appointees shall meet the following qualifications:</u>
Two appointees from the Department of Agriculture
Two appointees from the Department of Health
One appointee from the Department of Water Affairs and Forestry
One appointee from the Agricultural Research Council
One appointee from the South African Bast Crop Consortium

Members of the committee shall serve without compensation but shall be reimbursed for expenses including travel expenses necessary for the performance of their duties.
Not less than three months from the date of appointment, the committee shall submit a preliminary report to the Minister of Agriculture and the Minister of Health on the status of its recommendations.
Not less than two months following written recommendations from the Minister of Agriculture and the Minister of Health, the committee shall issue a final report.

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[clxxv] The Legislative Research Unit. "The Industrial Use of Hemp in South Africa." The Eastern Cape Provincial Legislature. April of 1998.

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Personal communication with Andre de Wet. Tel: 040 609 2631; Cell: 083 799 5564.
Also see: "Politicians call for legalisation of hemp." By Nick Wilson. Eastern Cape News. Thursday 13 August 1998.

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The Pondo traditionaly used it for high blood pressure and diabetes. Citizen 6 March 1995.

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ADAS, Bridgets Research Centre, Martyr Worthy, Winchester, Hampshire, S021 1AP, U.K.
Silsoe Research Institute, Wrest Park, Silsoe, Bedford, MK45 4HS, U.K.
Ecco Gleittechnik GmbH, Salzsteinstrasse 4, D-82402 Seeshaupt, Germany.
The Biocomposites Centre, University of Wales, Bangor, Gwynedd, LL57 2UW, U.K.
CPRO-DLO, PO Box 16, 67 00 AA Wageningen, The Netherlands.
Institut fur Angewandte Forschung, Fachhochschule fur Technik & Wirtschaft, Alteburgstrass 150, D-72762 Reutlingen, Germany.
Wageningen Agricultural University, Department of Agronomy, Haarweg 333, 6709 RZ Wageningen, The Netherlands.
Universita di Bologna, Dipartimento di Agronomia, Via Filippo, Re 68 Bologna, Italy.

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Alberta Research Council. 8 July, 1996. For more information, contact Wayne Wasylciw, Forest Products Consultant, Alberta Research Council, 250 Karl Clark Road, Edmonton, Alberta T6H 5X2. Email: wasylciw@arc.ab.ca.

[clxxxiv] Canadian Industrial Hemp Network www.ihn@interlog.com.

[clxxxv] The Natural Order. PO Box 850, Stn P, Toronto, Ontario M5S 2Z2. Tel: (416) 656-2067, Fax: (416) 653-7544. http://www.tno.com.

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[cc] PG Bison is the leading manufacturer of Bison Board products and the only manufacturer of Formica brand laminates in South Africa. P.G. Bison 322 Main Street Jeppestown P.O. Box 2352 Johannesburg 2000. Contact Person: Roddy Payne, Manager, Corporate Intelligence & Development. Tel: 011-880-4801; Email: roddyp@icon.co.za.

[cci] Masonite Africa Ltd. is a producer of hardboard, mineral fibre ceiling tiles, insulation, and a new prefinished door facing called TruGrain.

[ccii] Interested parties may contact the Southern Africa Bast Crop Consortium at Tel/Fax: 011 486 0279; Email: sahc@icon.co.za; Website: www.hemp.co.za.

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[ccxv] Free Filmakers. Contact Nick Hofmayer. Tel: 011 482 2131.

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[ccxvii] Hemcore Limited. Station Road, Felstead, Great Dunmow, Essex CM6 3HL Tel: 0371 820066 Fax 0371 820069 Ian Low – Director Tel: 0279 658313 Fax: 0279 755395 Cell: 0831 651255

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[ccxxix] Contact Dr. Janos Berenji. Institute of Field and Vegetable Crops. 21470 Backi Petrovac Yugoslavia. Tel: +831-21-780-365; Fax: +381-21-780-198; Email: berenji@Eunet.yu.
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[ccxxxiv] Hemp Times PO Box 460, Mt. Morris, IL 61054 USA. Tel: 1 800 806 7701.
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[ccxl] Hanf! Dr. Tatjana Brahms Verlag, PF 7, 79233 Vogtsburg. Tel: +49 7662 911990.
[ccxli] Hanfgesellschaft e. V. Waldemarstr. 33. 10999 Berlin. Tel: 030 614 2911; Fax: -614 9884.
[ccxlii] International Hemp Association. Postbus 75007 AA Amsterdam, The Netherlands. Tel/Fax: +31 20 6188758, Email: iha@euronet.nl.
[ccxliii] Hemp Industries Assoc. PO Box 1080, Occidental, CA 95465. Tel: 1-500-HIA-HEMP & 707 874 3648; Fax: 707 874-1104; Email: info@thehia.org. Websites: http://thehia.org.
[ccxliv] World Hemp Centre. Institute of Natural Fibres. Wojska Polskiego 71 b. 60-630 Poznan, Poland. Tel: (48-61) 22 48 15; Fax: (48-61) 417 830; Email: sekretar@iwn.inf.poznan.pl.

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[ccxlix] New Zealand Hemp Industries Association. Inc. PO Box 38 392, Howick, Aukland, N.Z. Tel: 64 9 273 2541; Fax: 64 9 273 7396; Email: nzhemp@es.co.nz.
[ccl] Hemp Industries Marketing Board of New Zealand. Ltd. Tel: 64 4 499 88 76; Fax: +644 499 8875; Email: enquire@hempboard.co.nz; Website:www.hempboard.co.nz.
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[cclxii] For more information contact Sotos Petrides, President, Robert Wood Director, Technical Section Wiseman Noble Canadian Pulp and Paper Association. E-mail: events@wisenoble.com; Email: rwood@cppa.ca.
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