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Flax & Industrial hemp valuable plants for agriculture and industry



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Introduction

Nowadays the main problem in UE agriculture and industry is mitigation of *natural conflicts* between :

- ***economical***

- ***ecological***

- ***social goals of production***



Conventional agriculture has caused **economic problems** associated with:

- **over production of food crops,**
- **increased costs of energy-based inputs,**
- **decreased farm incomes.**

In Poland agriculture has problems associated with:



In Poland In main problem of the farming result from:

- farms structure - high percentage of very small farms: < 5 ha,
- low level of farms specialization,
- farms underinvestment,
- little abilities of farms' self-investment,
- weak infrastructure of rural areas.

Ecological problems associated with conventional agriculture:

- **Soil and water pollution,**
(pesticides, mineral fertilisation)
- **Soil and genes erosion,**
- **Poor ecological diversity.**

Social problems associated with conventional agriculture



***The social and economic transformation in Poland
caused :***

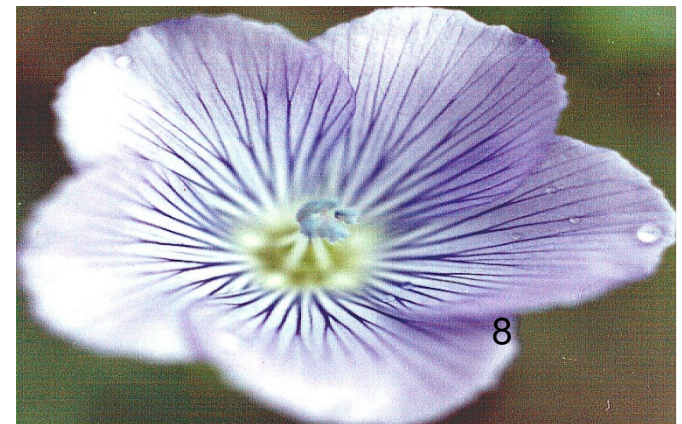
- increase of unemployment, in rural areas where governmental farms collapsed,***
- decrease of farmers' incomes,***
- low level of the mobility of the rural population,***
- difficult access of the farmers to education.***



The plant especially predisposed for the mitigation of the natural conflicts between economic, ecological and social goals of production is fibre flax.

***Linum usitatissimum* L.**

*"ussitatus" – useful, needed, regular;
the superlative degree of comparison of
this adjective – "ussitatissimus" – the most
useful, the most needed*



Economical problems can be solved by:

Increasing of agriculture profitability
(farmers sell fibre not straw - they sell
added value – their work)



Economical problems can be solved by:



- **breeding and growing flax cultivars resistant to biotic and abiotic stress,**
- **low-input technologies of flax cultivation (reduction of costs of fertilisers and plant protection chemicals purchase),**
- **optimisation of cultivation technology treatments (times, techniques of treatments).**

Ecological

- *reduced consumption of mineral fertilisers and pesticides,*



- *phytoremediation of polluted areas,*

- *solving environmental problems connected with agricultural activity.*

Pesticide application in Poland

2002-2008

Crop	Dose of pesticide a.i [kg/ha]
Apple tree	9.28
Tomato	8.70
Strawberry	6.59
Potatoes	3.52
Sugar beet	2.57
Winter Wheat	1.85
Lettuce	1.63
Oat	0.62
Fibre flax	0.26

Ac. Main Inspectorate
of Plant Health
and Seed Inspection

The average
dose of
pesticide
application In
Poland
1.86 kg
a.i. per ha

Social

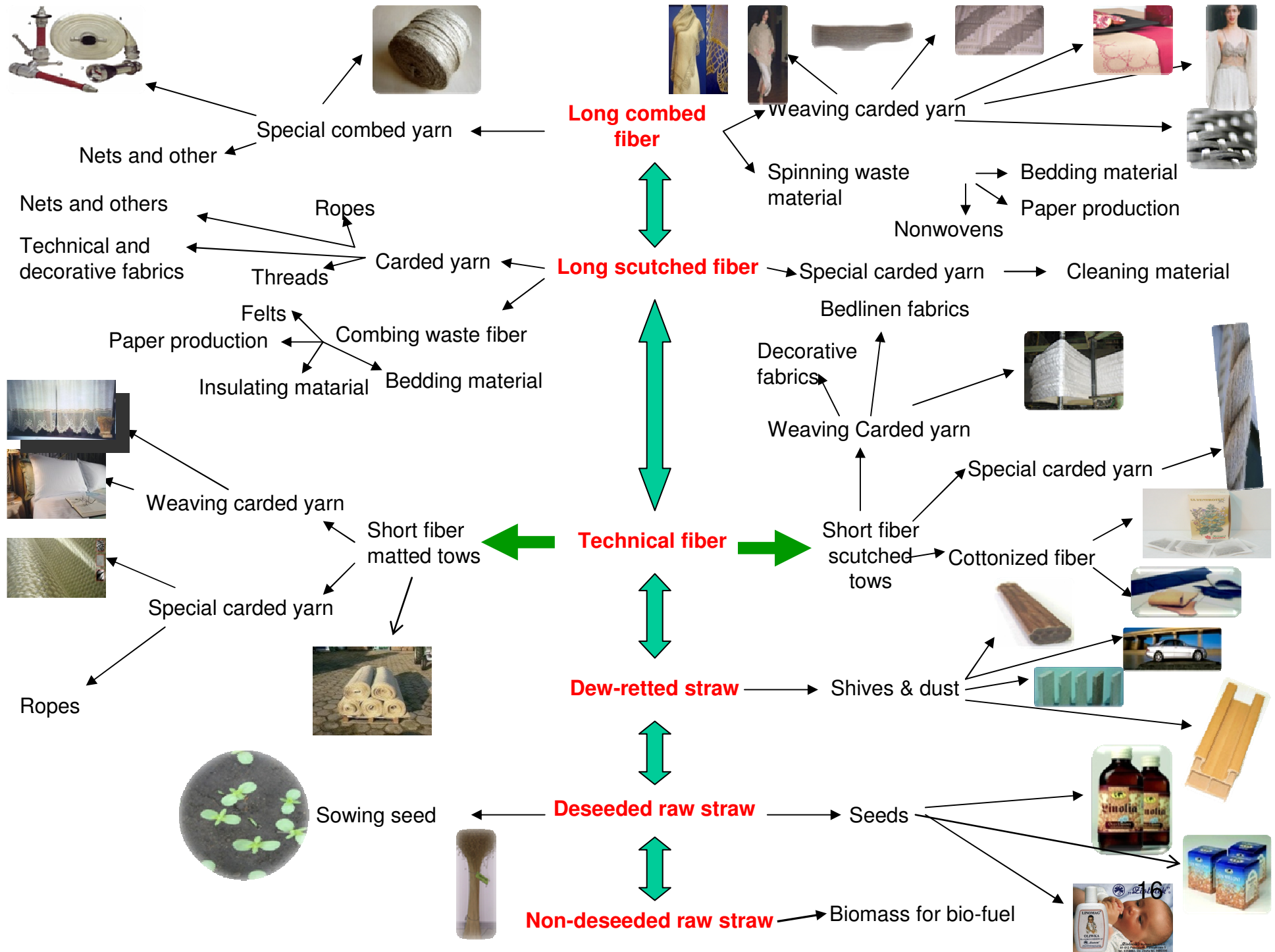
- actions towards reduction of unemployment (producers' groups),
- creating of new directions of developments for farms,
- domestic natural resources with high hygienic, health and use qualities,
- application of niche non-food plant production.



The growing of fibre flax can assure:

- applying environment-friendly methods of farming
- profitable incomes providing farmer with better standard of living
- reducing unemployment
- replacing non-renewable raw materials by renewable and biodegradable raw materials
- reducing problems of the overproduction of food crops

***Schema of potential
products obtained from flax
so called „Products Tree”
Prof. Dr. Waśko***



Conclusions and future strategies – can the role of flax increase ?

1. Agricultural aspect

- Good land for flax growing in EU is available
- Flax is a good crop for sustainable agriculture
- Flax is the most "organic crop" – 0,25 a.i. ha
- Green house effect – drought, high temp. not suitable for flax
- Problem with "fidelity of flax yielding" – it is hard to obtain large lots of good quality raw material
- Conflict between crop price # price of raw material
- Price must be lower, but producers income should rise
 - » Better yields
 - » Lower cost of production
 - » Exploiting the value of straw (ex; capsules, sheaves)

Conclusions and future strategies – can the role of flax increase ?

2. Economic aspect

- Market of natural and man made fibers is large (world; 10,5 kg/capita), part of flax is very small – 400 000 T)
- Increase in EU demand for natural fibers # import from countries outside EU.
- Non textile market
 - Non textile market grows - biocomposites, insulation, specialty pulp and paper, geotextiles)
 - Fibre must be cheap and have specific qualities
 - One cannot produce flax just for "cheap" non textile market
 - We should expand markets for this fibre based on specific qualities of flax:
 - » Hydroscopic, ecologic, insulation,
- Textile market
 - Prospects are good - natural fibre trends
 - Value of flax brand & image increases – PR + advertising + design
 - Price –
 - Not so important for clothing
 - More important for home
 - Price cut possible ?
 - How:
 - » Subsidy
 - » Reduction of cost production
 - » Increase production gives lower costs



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Industrial hemp valuable plants for agriculture and industry



Hemp breeding area in 2005r.on the world

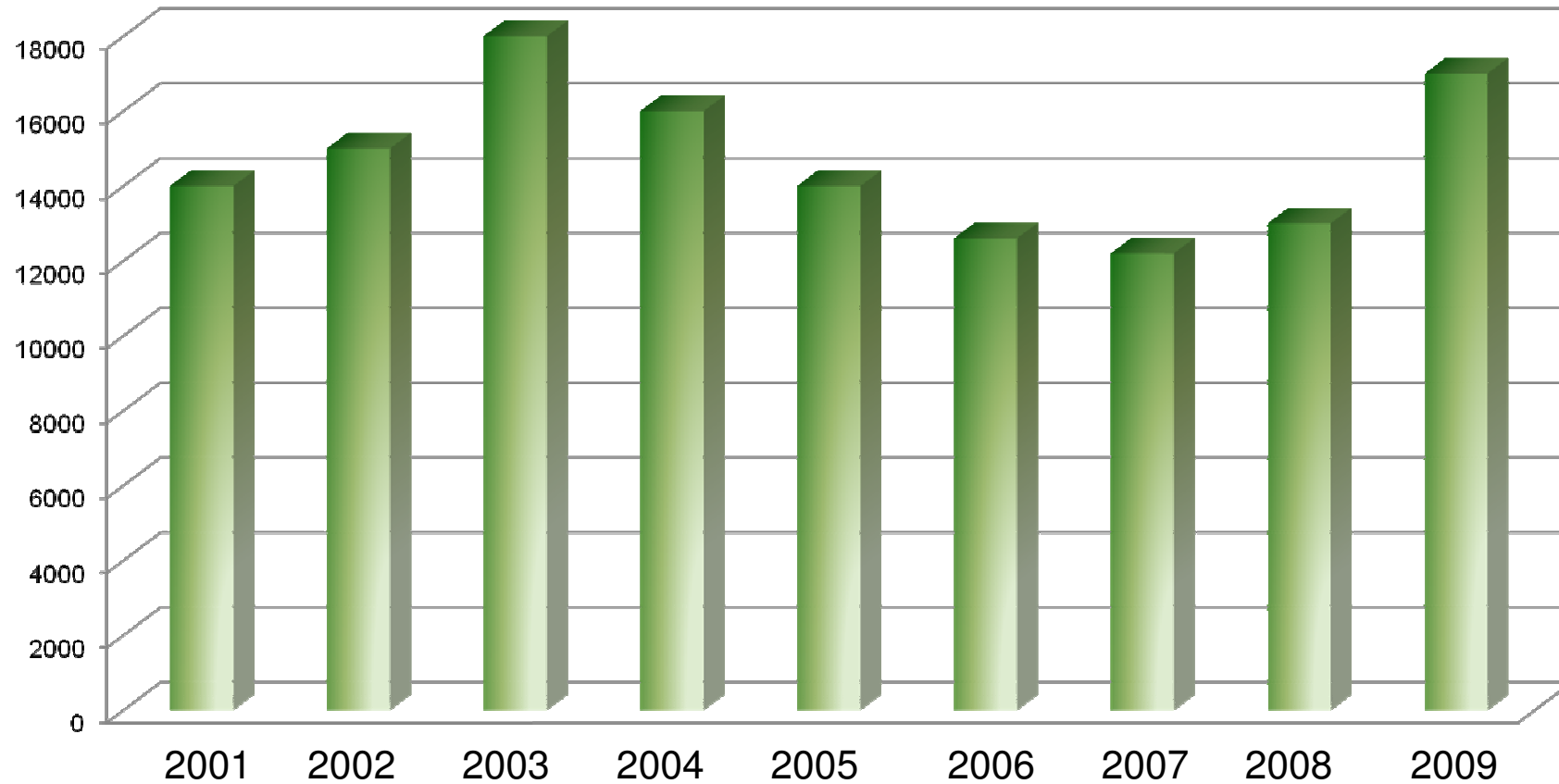
Area	Breedings area [ha]
EU	14 500
Other EU countries	5 700
Azja (Chiny, North Korea)	ok. 80 000
Australia	250
Canada	10 000
South America	4 300
summary	ok. 115 000



Quelle: Bouloc 2006a



Hemp breeding area of hemp in the EU



Hemp plant attractive to farmers

- guarantee high and stable yields
- good forecrop for cereal
- improve soil structure
- are covered with the basic and supplementary surcharge



Ecological advantages of hemp cultivation



- Produce an huge amount of green mass, which give perfect shade the soil during the growing season, and well-developed root system of plants is post-harvest decay
- Ensuring good ventilation of the soil and the supply of organic material give positive affect on its structure
- During biomass burning, emit less CO₂ and CO than the burning of fossil raw materials
- 1 hectare of hemp involves 2.5 tonnes of CO₂ reducing the greenhouse effect
- Does not require the use of plant protection products.



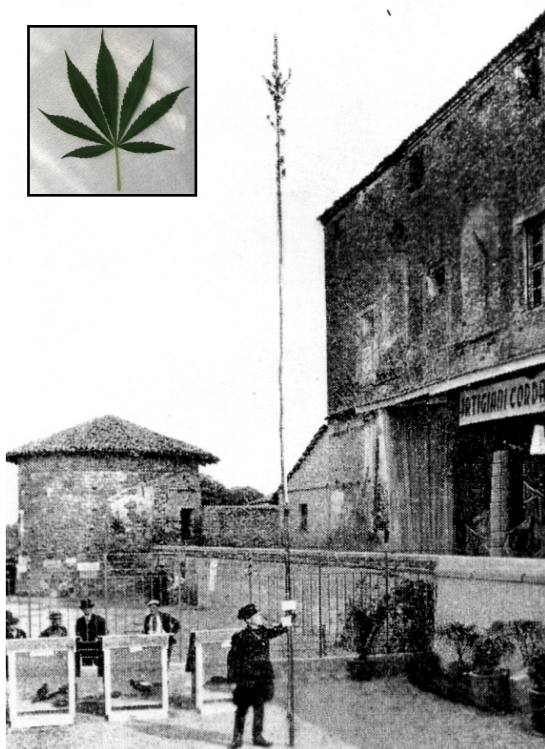
Hemp cultivation on contaminated areas



Hemp absorbs heavy metals such as Cd, Pb, Zn, Cu, contribute to the recultivation



Hemp straw – yield 10 t/ha



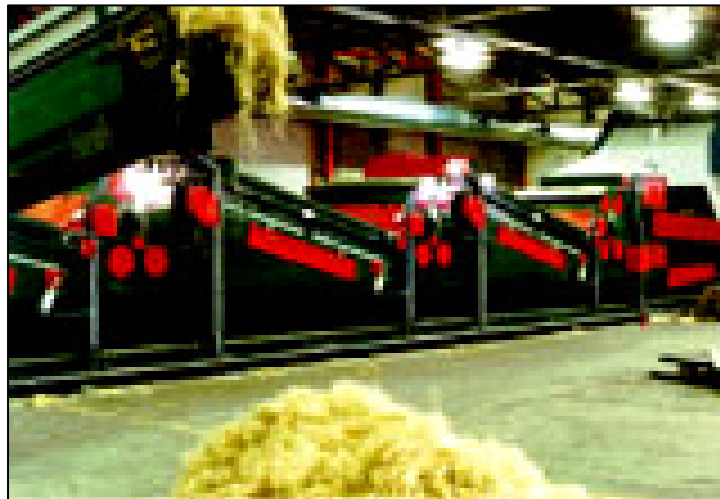
Hemp straw:



65-70% shives



25-30%
fiber



2006 - in UE were produced



22 000 - 24 000 t hemp fibre

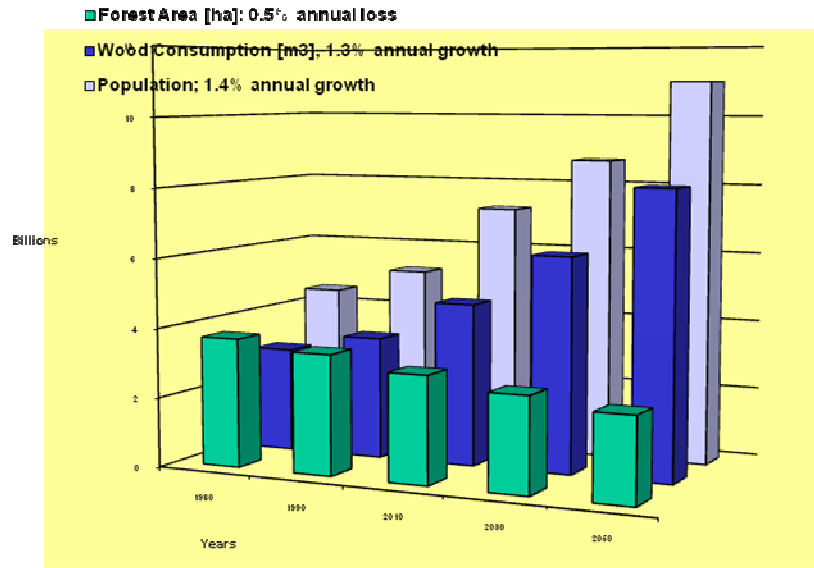


44 000 - 48 000 t hemp shives

Other utilisation of hemp



1. Pulp and paper



- . Hemp straw contain 25-30% of fibre, in which there is more than 70% of cellulose
 - Annual growth of cellulose produced by cannabis exceeds 2.5 times increase in cellulose extracted from trees
 - Technical and special paper is the main market for European hemp fibers (86% in volume and 73% of sales in 2003)

2. Building materials industry (fibre)



STEICO



STEICO Group - international corporation with its main shareholder - STEICO AG producing boards and insulation mats from wood and hemp fibres



STEICO AG is European market leader in environmentally-friendly insulation materials made from natural wood fibres

The main objective of its activity is providing products that are healthy and made of natural raw materials.



Insulation made from hemp fibre:

- help to save valuable energy, consequently reducing the negative impact on the environment caused by energy generation,
- contribute to the reduction of CO₂ emission. During growth phase plants bind CO₂, thus removing it from the atmosphere. In order, up to 1t CO₂ is bound in 1m³ of wood. This gas remains stored in insulation materials for the whole of their life cycle,
- help to control the air humidity in buildings - the natural fibre insulation can store relatively high moisture.



2. Building materials industry (shives)



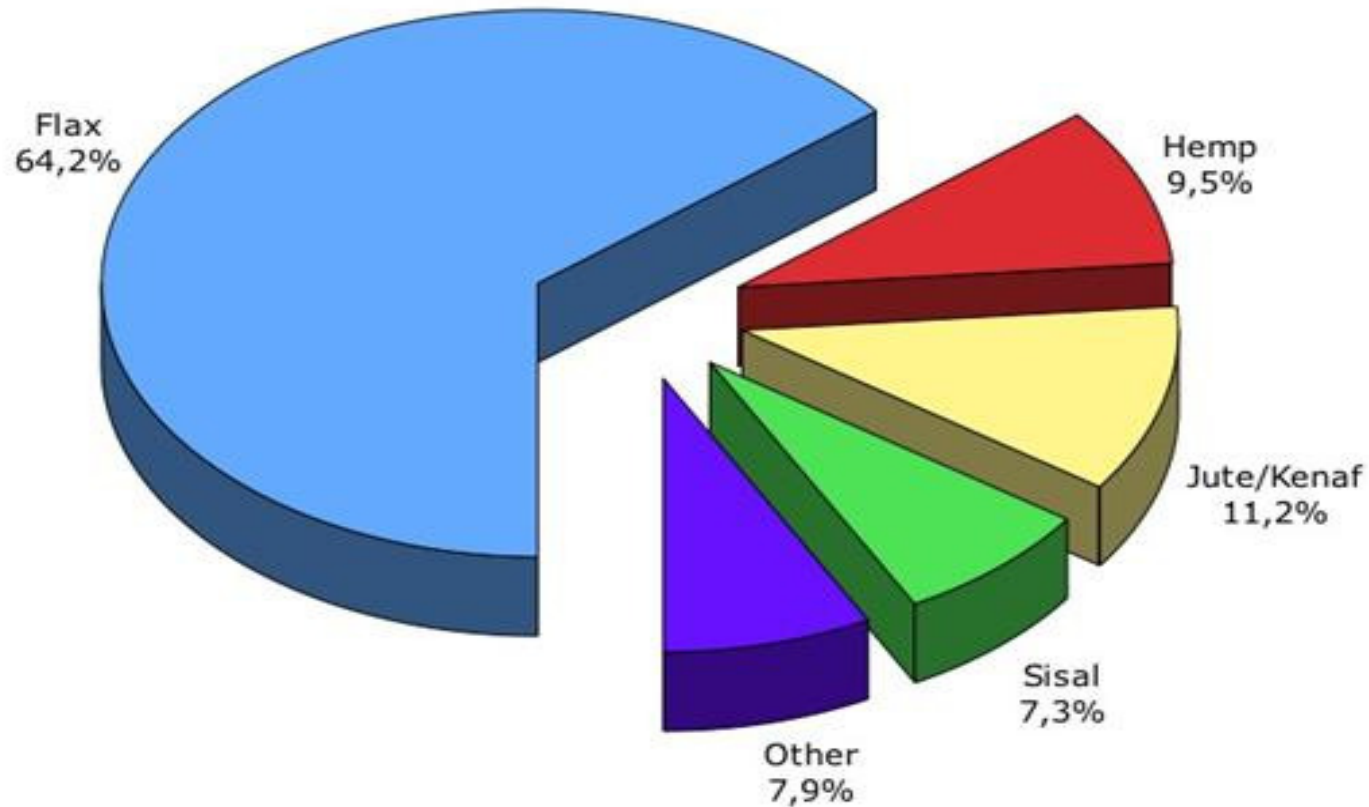
3. Automotive Industry – innovative technology



German Automotive Industry

Use of Natural Fibres for Composites in the German Automotive Industry 2005

Total: 19.000 t



4. Natural fibre composites wide range of application possibilities



Grinding Disk

Scale



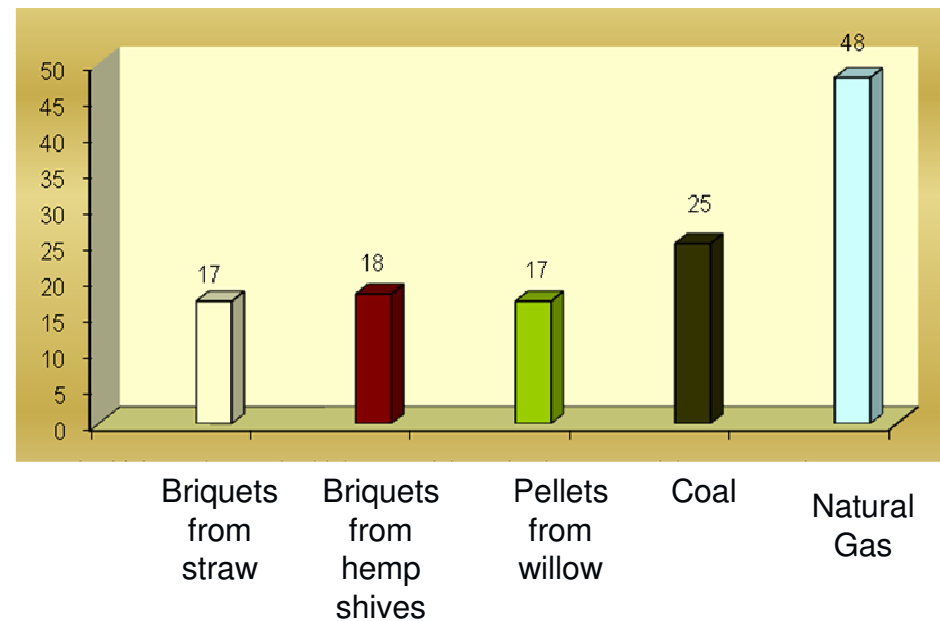
Toy Cars
Made by Injection Moulding

5. Energy industry

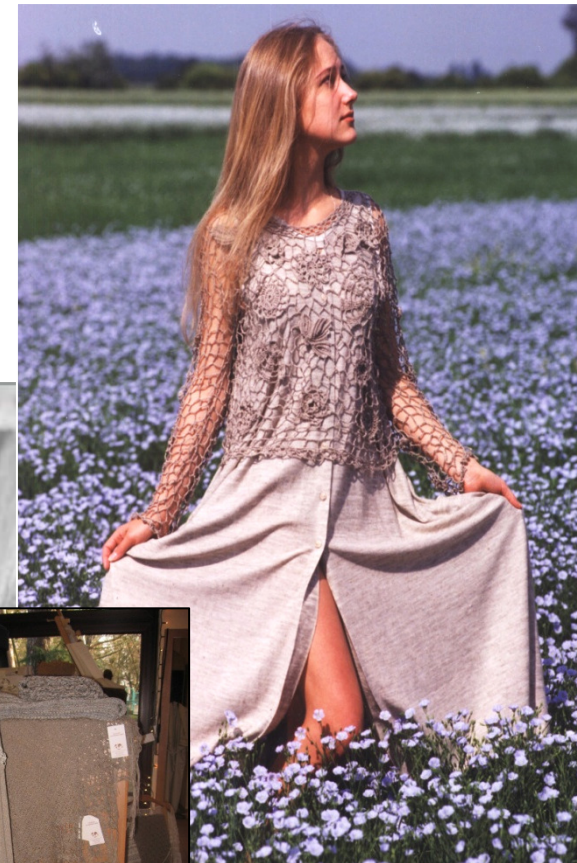
- whole plants
- straw
- shives

Heat of combustion of selected materials [MJ/kg]

INF&MP



6. Textile industry



7. Agrotextiles garden easy to handle base for agricultural use (fibre)



Agrotextiles cress

an environment friendly, annual renewable
base layer for the plant industry replacing peat
(fibre)



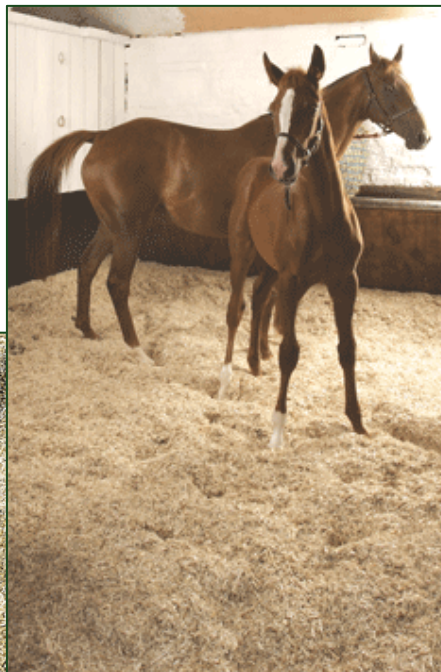
Cress production

Decorative alternative to bark (shives)



8. Animal bedding – implementation for the comfort of your animal

EU 2007: 48 000 t
production of
hemp shives

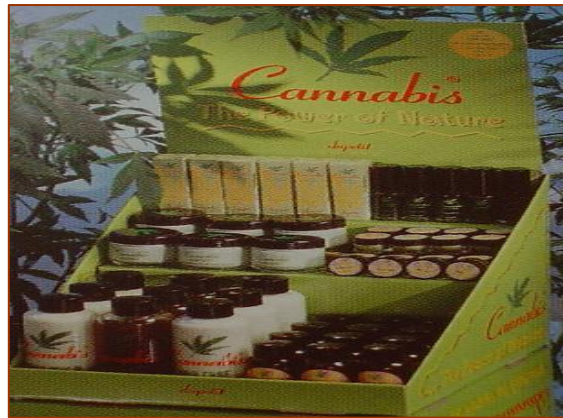


Animal Bedding



Chicken farming

Hemp seeds

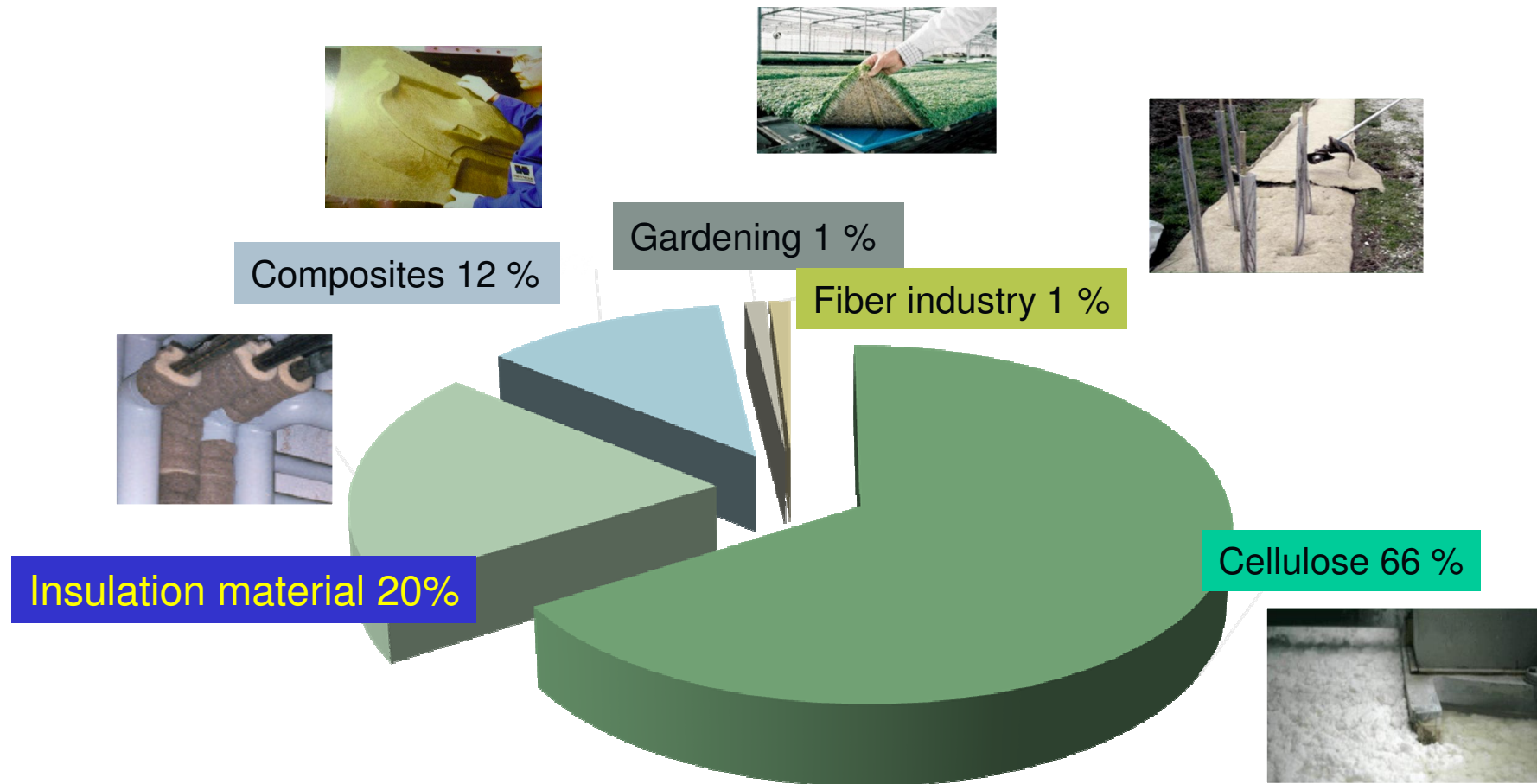


- chemical
- cosmetics
- food
- pharmaceutical

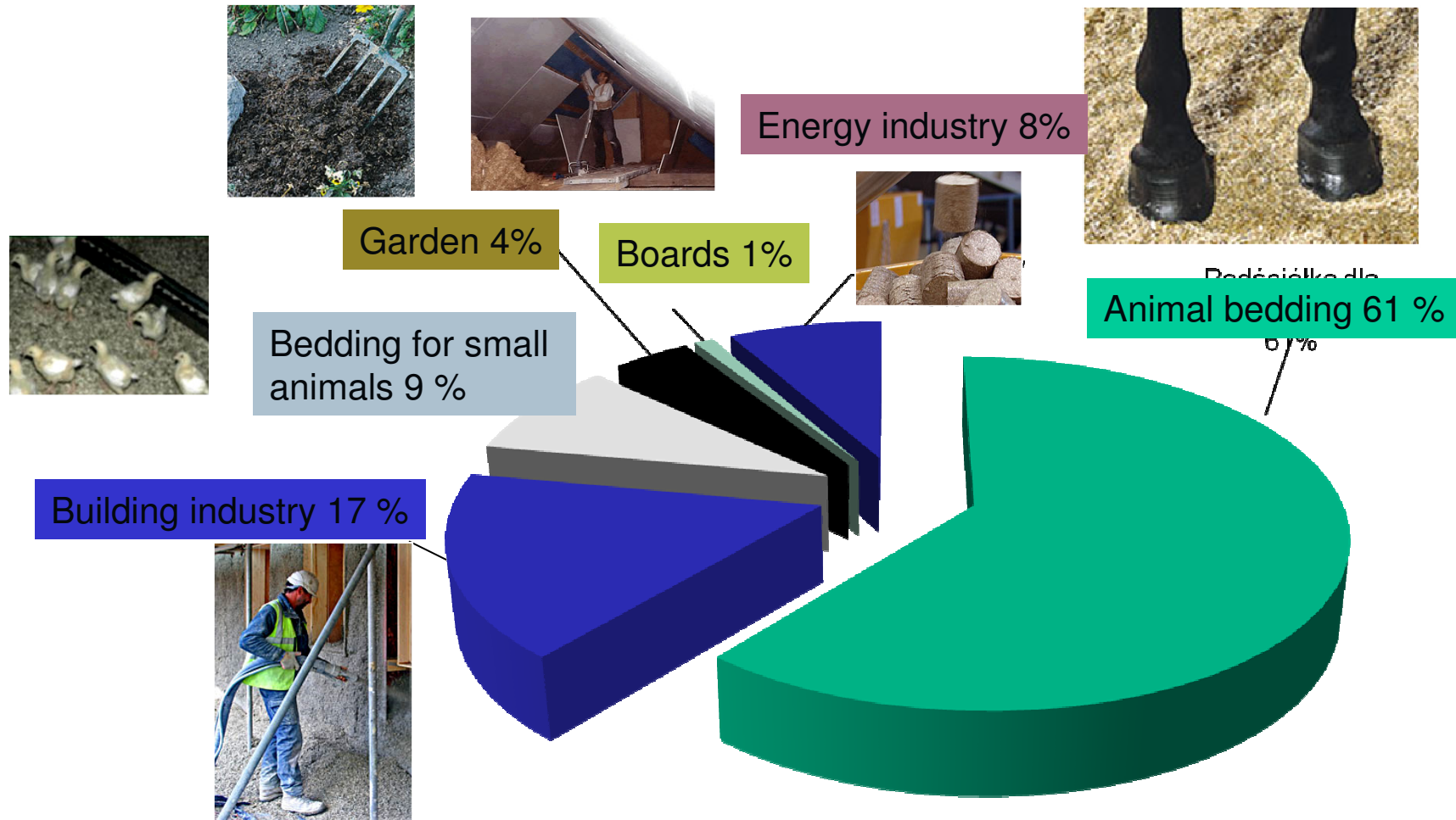


- paints, varnishes, lubricants and diesel, cosmetics,
- edible oils, dietary foods, bakery products

Markets for hemp fiber in EU - 2006 -



Markets for hemp shives in EU - 2006 -



Why hemp?

Benefits:

- ❖ well adapted to our climatic conditions and soil,
- ❖ rapid increase of biomass - in 100 days reaching about 4 m height,
- ❖ high yield of biomass - about 10 t/ha, even with moderate fertilization
- ❖ cultivation does not require the use of plant protection products
- ❖ improve soil structure, good forecrop for other species,
- ❖ relatively resistant to periodic water shortage
- ❖ may be a recultivation plant



Why hemp?

Benefits:

- ❖ demand for natural fibers is growing worldwide, it increases the prices of jute, sisal and kenaf,
- ❖ rising timber prices,
- ❖ persistent water shortages and epidemics on cotton plantations,
- ❖ nutritive value of seeds does a sensation not only in America, but also recently in Europe.

