

Journal of
INDUSTRIAL
HEMP™

Volume 8
Number 2
2003

CONTENTS

EDITORIAL

- Welcome to the *Journal of Industrial Hemp* 1
Robert Clarke
Janet Erisman
David Pate
David Watson
Hayo van der Werf

PEER-REVIEWED PAPERS

- Evaluating the Impact of THC in Hemp Foods and Cosmetics
on Human Health and Workplace Drug Tests: An Overview 5
Franjo Grotenhermen
Gero Leson
Petra Pless

In recent years, the presence of trace residual delta-9-tetrahydrocannabinol (THC) in food and cosmetics from hemp seed and seed derivatives (oil, hulled seed) has

raised concerns over THC's potentially adverse impacts on human health and on the results of workplace drug tests for marijuana. Two desktop studies and one experimental study were conducted to evaluate whether (1) the ingestion of high amounts of foods containing properly cleaned hemp seeds or their derivatives could cause psychoactivity or other undesirable impacts on human health, (2) the ingestion of these hemp foods may produce sufficiently high urine levels of THC metabolites to cause positive urine tests for marijuana and (3) the extensive use of hemp oil cosmetics may cause, or contribute to adverse health effects or a positive urine test. This paper provides an overview of these studies and presents their results and conclusions. In summary, the studies suggest that, at the levels now typical in Canadian hemp seed, THC in hemp foods and cosmetics does not cause unintentional psychoactivity, other adverse health effects or confirmed urine tests for marijuana. These levels provide protection from such effects with a wide margin of safety, even for individuals who consume hemp foods and cosmetics frequently and extensively.

KEYWORDS. Hemp, cannabis, marijuana, THC, cannabinoids, hemp food, health risk, workplace drug test, cosmetics, health effects, lowest observed effect level, acceptable daily intake

A Preliminary Study of Pollen Dispersal in *Cannabis sativa* in Relation to Wind Direction

37

Ernest Small
Tanya Antle

Pollen of *Cannabis sativa* is disseminated by wind in large amounts and for long distances, and regulations concerning the production of pedigreed seed of industrial hemp, therefore, often call for extremely large isolation distances to prevent unwanted pollination. In Europe and Canada, a standard distance of 5 km is required for the highest classes of hemp seed. This study examines the relative distribution of pollen from an isolated field over the 3-week maximum flowering period, with particular reference to wind direction. The amount of pollen distributed downwind was about six times the amount distributed upwind. In effect, this means that an isolation distance of 5 km on the downwind side is about equivalent to an isolation distance of 0.9 km on the upwind side. In theory, at the experimental site examined, the required isolation area could be reduced by about 58% while still achieving the equivalent of 5 km isolation in all directions. Given that weedy and illegally cultivated plants are widespread, making it difficult to ensure their absence over a distance of 5 km, it seems advisable, when possible, to take advantage of the considerably reduced isolation distance that is necessary on the upwind side. Pollen distribution appeared to follow the expected leptokurtic curve, reducing rapidly with initial distance from the source, but much more slowly with increasing distance. This makes it impossible to guarantee complete absence of potentially contaminating pollen in the field and, for practical purposes, a very low amount of undesired gene flow needs to be tolerated.

KEYWORDS. *Cannabis sativa*, hemp, marijuana, pollen, isolation distance

Qualitative and Quantitative Aspects of the Inheritance
of Chemical Phenotype in *Cannabis*

51

Giuseppe Mandolino
Manuela Bagatta
Andrea Carboni
Paolo Ranalli
Etienne de Meijer

Four crosses were made between *Cannabis* plants with “pure” CBD and THC chemotypes. The F_1 plants obtained were self-fertilised to produce F_2 s. Chemotypical distributions were analysed by gas-chromatography. A segregation analysis of the different F_2 progenies obtained showed that chemotype, estimated as CBD/THC ratio, behaves as a qualitative character, and a model for a single locus B , with two co-dominant alleles, B_D and B_T is described. The CBD/THC ratios in the F_1 offsprings were found to be significantly different in the heterozygous plants from the different pedigrees. The amount of CBD plus THC in the same pedigrees was also described. Heterosis was found to be a common feature, but not a general one, of cannabinoid accumulation in the F_1 s. Distribution of the values of cannabinoid content in classes was found to be normal. RAPD markers linked to the segregating chemotypes (“pure” CBD and “pure” THC) were identified by bulk segregant analysis, and the degree of linkage of these markers with the chemotype was described.

KEYWORDS. *Cannabis*, chemotype, inheritance, genetic analysis, RAPD markers

OTHER CONTRIBUTIONS

Use of Natural Fibres in Composites in the German and Austrian
Automotive Industry—Market Survey 2002: Status, Analysis
and Trends

73

Michael Karus
Markus Kaup
Sven Ortmann

A survey of the use of natural fibres (exclusive of wood and cotton) in composites used in the German and Austrian automotive industry revealed an average yearly growth rate of the amount used of 22% for the period from 1999 to 2002. In 2002 a total of 17,200 tons of fibre was used, 2,200 tons of which were hemp. In comparison to a survey in 2000, a clear trend towards the use of thermoplastic rather than thermoset press-moulding techniques can be observed. For the future an increase in the use of injection moulding techniques is expected.

KEYWORDS. Automotive industry, composites, flax, hemp, market development, natural fibres, press moulding

HEMP-SYS: Design, Development and Up-Scaling of a Sustainable Production System for HEMP Textiles– An Integrated Quality SYStems Approach <i>Stefano Amaducci</i>	79
--	----

HEMP-SYS is a European Union (EU) Project funded under the thematic programme: Quality of life and management of living resources of the 5th Framework, key action 5.2. The project has officially started on 1st November 2002 and will be carried out for 36 months. Scientific and industrial partners will tackle the main problems of the hemp fibre production chain for textile destination from cultivation to the development of end products. Main objectives of the project are: provide decision support to primary producers, produce an integrated quality control system for raw and processed products, disseminate information to support the entire chain of the hemp fibre industry. Main expected project results are: innovative hemp fibre production systems with decision support tools for farmers, optimal processing methods, a prototype for an integrated quality control system, disseminated knowledge and high-value hemp textile end products.

KEYWORDS. Hemp fibre, processing, production chain, quality control, textile products

COLLECTIONS CORNER: INDUSTRIAL HEMP COLLECTIBLES FROM INTERNATIONAL COLLECTIONS <i>Robert C. Clarke</i>	85
--	----

Naxi <i>Dongba</i> Funerary Scroll <i>Robert C. Clarke</i>	87
---	----

This is the first in a series of articles that will present singularly fascinating industrial hemp items from private or public collections. Almost any category of curiosity can qualify as long as it is made of hemp and/or used only for hemp related activities and as long as it is accompanied by sharp photos and a short article. The Naxi God's Road funerary scroll pictured and described in this article is an excellent example of a fascinating hempen collectible. It is genuinely made of hemp, it is obscure enough to be rare, it is well enough documented so that an interesting history presents itself, similar pieces from public collections have been published, it was recently purchased and most importantly—fellow hemp collectors still have enough of a chance of finding another one to continue searching.

KEYWORDS. China, *dongba*, ethnography, funerary scroll, hemp cloth, Naxi, Yunnan Province

THE WIDE WILD WORLD OF HEMP

Profiles in Courage <i>John E. Dvorak</i>	103
--	-----

It takes courage to create a new industry from the ground up. In many ways, especially in North America, the hemp industry's recent resurgence is being fueled by

individuals who are risking their livelihood in an effort to promote the various benefits of hemp. The common thread in this column revolves around the courage shown by these people, organizations and companies as they work to produce innovative, profitable, environmentally friendly products.

KEYWORDS. Canada, drug enforcement agency, hemp food

CANNABIS CLINIC

The Hemp Russet Mite

107

John M. McPartland

Karl W. Hillig

The hemp russet mite *Aculops cannabicola* (Farkas) is a little-known but potentially dreadful pest. It primarily feeds on leaves, petioles, and meristems. The mites quickly spread between plants grown in proximity. They cause a curling of leaf edges, followed by leaf russeting. The mites feed on the inflorescences of both sexes, and on glandular trichomes, severely reducing resin production. The hemp russet mite constitutes a real menace to world hemp cultivation, because it cannot be controlled easily.

KEYWORDS. *Aculops cannabicola*, biological control, greenhouse, mite, pest