

**Komoditas : Ramie
Tahun 2004-2008 (11 judul)**

Jian-xin LIU, Chun-ming YU, Shou-wei TANG, Ai-guo ZHU, Yan-zhou WANG, Si-yuan ZHU, Xiong-feng MA, He-ping XIONG, Cloning and Expression of Key Enzyme Gene GalAT in Ramie Pectin Biosynthesis, *Agricultural Sciences in China*, Volume 8, Issue 6, June 2009, Pages 664-670, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60262-X.

(<http://www.sciencedirect.com/science/article/B82XG-4WKTN1K-5/2/78b0370e48338fe84317b69a45d7604b>)

Abstract:

To isolate the cDNA partial sequence of key enzyme gene GalAT for pectin biosynthesis in ramie [*Boehmeria nivea* (L.) Gaud], and thus to understand the expression of GalAT gene in different tissues of ramie, degenerate primer was designed according to GalAT conserved sequence in other species reported, and the cDNA sequence of GalAT gene from ramie variety Zhongzhu 1 was cloned by RT-PCR method based on the degenerate primer. The cDNA revealed a 986-bp in length which encoded 328 amino acids. The cDNA sequence and putative amino acid sequence of GalAT shared high identity with previously reported *Arabidopsis thaliana* GAUT4 (GalAT) as 77 and 83%, respectively. Molecular evolution analysis showed that the putative amino acid sequence and *Arabidopsis thaliana* GAUT4 gathered to a same group. Real-time quantitative PCR analysis showed that GalAT mRNA accumulated most abundantly in root, and GalAT transcripts in all kinds of ramie tissues in turn revealed as follows: root > leaf > bast > or [approximate] xylem.

Keywords: clone; GalAT; pectin; ramie; real-time quantitative PCR analysis

Hu-cheng XING, Wei SHE, Zhong-qin LUO, Zhan-jun QIN, Yu-cheng JIE, Study on the Relationship Between Sex Differentiation and Ethylene in Ramie, *Agricultural Sciences in China*, Volume 8, Issue 4, April 2009, Pages 418-423, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60227-8.

(<http://www.sciencedirect.com/science/article/B82XG-4W4TVVW-6/2/1f6d572117b8253731c495b1b747ecb2>)

Abstract:

To explore the role of ethylene in sexual determination in ramie, the ethylene release rates in ramie stem apex of different sex, bud of the same node in female and hermaphrodite ramie in the second crop, and single inflorescence of different sex in hermaphrodite ramie were measured by gas chromatography. Effects of two ethylene inhibitors on sex expression in ramie were investigated. The ethylene release rate of stem apex was higher in the second crop or female ramie than that in the third crop or hermaphrodite ramie during growth. Although ethylene release rates between lower nodes and higher nodes were little different, it was lower in the middle nodes in hermaphrodite ramie. The ethylene release rates were higher in the higher nodes of female ramie at the second crop. At the third crop, the ethylene release rates were higher in lower nodes, lower in middle nodes and then highest in higher nodes in female ramie. However, an opposite ethylene release pattern was observed in hermaphrodite ramie. The ethylene release rate was higher in female flower than male flower and mixed inflorescence in hermaphrodite ramie. The male flower could be distinctly induced by AVG (aminooethoxyvinylglycine). The node of the first male flower, percentage of female flowers and ratio of female flowers to male in ramie were evidently depressed by AVG in contrast to water. The percentage of mixed male and female flowers was also increased and the percentage of female flower decreased by spraying AgNO₃. There was a close relationship between sexual differentiation and ethylene release rate in ramie.

The female ramie could be induced by high ethylene release rate. The female flower could be inhibited by AVG and AgNO₃. AVG at a concentration of 300 mg L⁻¹ was most effective.

Keywords: ramie [*Boehmeria nivea* (L.) Gaud]; sex; ethylene

Li-jun LIU, Ding-xiang PENG, Bo WANG, Genetic Relation Analysis on Ramie [*Boehmeria nivea* (L.) Gaud.] Inbred Lines by SRAP Markers, *Agricultural Sciences in China*, Volume 7, Issue 8, August 2008, Pages 944-949, ISSN 1671-2927, DOI: 10.1016/S1671-2927(08)60133-9.

(<http://www.sciencedirect.com/science/article/B82XG-4T9DCT2-6/2/df899cba7547b2288c6d672aeabe2ae0>)

Abstract:

The objective of this article is to reveal the variations of ramie inbred lines in DNA level and discuss their molecular background to provide a theoretical basis for ramie cross breeding. In the present study, the genetic relationships among 33 inbred line accessions and two wild types that originated from China and Brazil were estimated using sequence-related amplified polymorphism (SRAP) markers. The results showed that 33 out of 81 primer combinations turned out to be polymorphic and 332 polymorphism bands were obtained. On the basis of the appearance of the markers, the genetic relationships were analyzed using unweighted pair-group method of arithmetic average cluster analysis (UPGMA), and the genetic Jaccard similarity coefficients were calculated. The inbred-lines originating from China and Brazil formed a cluster suggesting a possibility that the Brazilian cultivars could have developed from cultivars introduced from China. Within ramie inbred-lines, the groupings also indicated that the greatest genetic relationship among cultivars was correlated to the region of origin of cultivars. The results provided the evidence that SRAP was an efficient approach, suitable for taxonomic analysis of ramie inbred lines. To the authors' knowledge, this is the first application of SRAP marker on the systematics of ramie inbred lines.

Keywords: relatives of ramie inbred lines; SRAP; taxonomic analysis; UPGMA

Guangting Han, Leilei Wang, Meina Liu, Yuanming Zhang, Component analysis and microfiber arrangement of *Apocynum venetum* fibers: The MS and AFM study, *Carbohydrate Polymers*, Volume 72, Issue 4, 10 June 2008, Pages 652-656, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.10.002.

(<http://www.sciencedirect.com/science/article/B6TFD-4PWF0MS-1/2/b95c8aafdda3447261d0121bf629dbf9>)

Abstract:

In this paper, electrospray ionization/mass spectrometry (ESI-MS) was used to investigate the changes of flavonoids in the extract of the bast of AV and AV fibers. It is suggested that the quercetin structure maybe exist in the extract of the bast of AV, and then high resolution time-of-flight (TOF) MS was used to further characterize the possible ions. The identification of quercetin in the extract of the bast of AV was confirmed, while it was disappeared or tailed off in that of AV fibers. This indicated that such kind of compounds maybe destroyed during the degumming process. The microstructures of AV fibers and ramie fibers have been studied by atomic force microscopy (AFM) and it can be seen that the arrangements of microfiber of ramie were more compact than that of the AV fibers. These results may contribute to further clarify the functions of health-care and antibacterial functions of the AV fabrics.

Keywords: *Apocynum venetum* fiber; ESI-MS; TOF-MS; AFM

Xin Wang, Yunguo Liu, Guangming Zeng, Liyuan Chai, Xiaochen Song, Zongyi Min, Xin Xiao, Subcellular distribution and chemical forms of cadmium in *Boehmeria nivea* (L.) Gaud., *Environmental and Experimental Botany*, Volume 62, Issue 3, April 2008, Pages 389-395, ISSN 0098-8472, DOI: 10.1016/j.envexpbot.2007.10.014.

(<http://www.sciencedirect.com/science/article/B6T66-4PW5XM4-5/2/c4ddeff43e1b99976b0baeab710a9a12>)

Abstract:

Bechmeria nivea (L.) Gaud. (Ramie) is a promising species for Cd phytoextraction with large biomass and fast growth rate. Nevertheless, little information is available on its tolerance mechanisms towards Cd. Determination of Cd distribution and chemical speciation in ramie is essential for understanding the mechanisms involved in Cd accumulation, transportation and detoxification. In the present study, ramie plants were grown in hydroponics with increasing Cd concentrations (0, 1, 3, 7 mg l⁻¹). The subcellular distribution and chemical forms of Cd in different tissues were determined after 20 days exposure to this metal. To assess the effect of Cd uptake on plant performance, nitrate reductase activity in leaves and root activity were analyzed during the entire experimental period. Increased Cd level in the medium caused a proportional increase in Cd uptake, and the highest Cd concentration occurred in roots, followed by stems and leaves. Subcellular fractionation of Cd-containing tissues indicated that about 48.2-61.9% of the element was localized in cell walls and 30.2-38.1% in soluble fraction, and the lowest in cellular organelles. Cd taken up by ramie rapidly equilibrated among different chemical forms. Results showed that the greatest amount of Cd was found in the extraction of 1 M NaCl and 2% HAC, and the least in residues in all test tissues. In roots, the subdominant amount of Cd was extracted by d-H₂O and 80% ethanol, followed by 0.6 M HCl. While in stems and leaves, the amount of 0.6 M HCl-extractable Cd was comparable with that extracted by 80% ethanol or d-H₂O. 1 mg l⁻¹ Cd stimulated nitrate reductase activity in leaves and root activity, while a concentration-dependent inhibitory effect was observed with increasing Cd concentration, particularly at 7 mg l⁻¹ Cd. It could be suggested that the protective mechanisms evolved by ramie play an important role in Cd detoxification at relatively low Cd concentrations (below 3 mg l⁻¹ Cd) but become restricted to maintain internal homeostasis with higher Cd stress.

Keywords: Cadmium; Ramie; Subcellular distribution; Chemical form; Nitrate reductase activity; Root activity

Chen Qin, Nattakan Soykeabkaew, Ni Xiuyuan, Ton Peijs, The effect of fibre volume fraction and mercerization on the properties of all-cellulose composites, *Carbohydrate Polymers*, Volume 71, Issue 3, 8 February 2008, Pages 458-467, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.06.019.

(<http://www.sciencedirect.com/science/article/B6TFD-4P4298Y-1/2/d99dc5384050de5a4b9dca324fe9ea5e>)

Abstract:

All-cellulose composites with 85-95% fibre volume fraction were successfully prepared by using solutions of 1-7% (wt/v) cellulose concentrations (dissolved ligno-cellulosic ramie fibres in LiCl/DMAc) for impregnation of aligned ramie fibres. The effect of mercerization or alkali treatment to the properties of the prepared composites was also investigated. The structure, morphology, and mechanical properties of the composites were characterized by scanning electron microscopy, X-ray diffraction, Raman spectroscopy, and tensile testing. After mercerization, tensile strength of the prepared composites was improved by 15-95%. The optimal all-cellulose composite, was based on a cellulose matrix obtained from a 4% cellulose concentration in solution, which led to a fibre volume fraction of 85%, resulting in an optimal combination of a sufficient amount of matrix phase with good fibre wet-out due to a low matrix viscosity and a high tensile strength due to a high fibre volume fraction. Alkali treatment successfully further improved the tensile strength of these composites from 440 MPa for un-mercerized composites to 540 MPa for mercerized composites, which are values that compare very favourable to more traditional random and unidirectional natural fibre based composites. Raman spectroscopy indicated that orientation of the aligned ramie fibres in the mercerized composites is well-maintained. X-ray diffraction confirms that native cellulose I, which is the major polymorphic modification of cellulose in these composites, is rearranged to cellulose II crystal packing after mercerization.

Keywords: All-cellulose composites; Fibre volume fraction; Mercerization; Mechanical properties

Zhao-Tie Liu, Yani Yang, Lili Zhang, Ping Sun, Zhong-Wen Liu, Jian Lu, Heping Xiong, Yuande Peng, Shouwei Tang, Study on the performance of ramie fiber modified with ethylenediamine, *Carbohydrate Polymers*, Volume 71, Issue 1, 5 January 2008, Pages 18-25, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2007.05.008.

(<http://www.sciencedirect.com/science/article/B6TFD-4NRK4JB-4/2/82864defee7e01346d69925fe3a6f7c8>)

Abstract:

The chelate molecule, ethylenediamine, was incorporated onto the surface of ramie fiber via sequential reactions of the hydroxyl groups on ramie fiber with epichlorohydrin followed by the chelating agent. The performance of the modified material (CeNH) was characterized by Fourier transform infrared spectroscopy (FT-IR), X-ray diffraction (XRD), scanning electron micrographs (SEM), thermogravimetry analysis (TGA), UV-Vis, and elemental analysis. Results show that the excellent characteristics of the raw fiber were still remained after modification although the crystallinity of the modified fiber decreased. The modification parameters were optimized as the concentration of ethylenediamine of 0.75 mol/l, the temperature of 50 [degree sign]C, and the reaction time of 5 h. Meanwhile, the dye of C.I. reactive red 2 was used to study the dyeability of the raw and the modified fibers. The color strength and the dye uptake of the modified fiber increased obviously with an increase in the nitrogen contents in CeNH. The color strength and the dye uptake of the modified fiber can be controlled by changing the extent of surface modification of raw ramie fiber.

Keywords: Ramie fiber; Ethylenediamine; Epichlorohydrin; Dyeing; Surface modification

T. Saito, Y. Okita, T.T. Nge, J. Sugiyama, A. Isogai, TEMPO-mediated oxidation of native cellulose: Microscopic analysis of fibrous fractions in the oxidized products, *Carbohydrate Polymers*, Volume 65, Issue 4, 13 September 2006, Pages 435-440, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2006.01.034.

(<http://www.sciencedirect.com/science/article/B6TFD-4JGJJ95-2/2/cf40f9a58062f540fc8364f2fe454a85>)

Abstract:

The 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO)-mediated oxidation was applied to aqueous suspensions of cotton linters, ramie and spruce holocellulose at pH 10.5, and water-insoluble fractions of the TEMPO-oxidized celluloses collected by filtration with water were analyzed by optical and transmission electron microscopy and others. The results showed that both fibrous forms and microfibrillar nature of the original native celluloses were maintained after the TEMPO-mediated oxidation, even though carboxylate and aldehyde groups of 0.67-1.16 and 0.09-0.21 mmol/g, respectively, were introduced into the water-insoluble fractions. Neither crystallinity nor crystal size of cellulose I of the original native celluloses was changed under the conditions adopted in this study. Carboxylate groups in the TEMPO-oxidized ramie were mapped by labeling with lead ions as their counter ions. The transmission electron micrographs indicated that some heterogeneous distribution of carboxylate groups along each cellulose microfibril or each bundle of cellulose microfibrils seemed to be present in the TEMPO-oxidized celluloses.

Keywords: Cellulose; Microfibril; TEMPO; Oxidation; Surface; TEM

Junli Huang, Guixue Wang, Li Xiao, Cloning, sequencing and expression of the xylanase gene from a *Bacillus subtilis* strain B10 in *Escherichia coli*, *Bioresource Technology*, Volume 97, Issue 6, April 2006, Pages 802-808, ISSN 0960-8524, DOI: 10.1016/j.biortech.2005.04.011.

(<http://www.sciencedirect.com/science/article/B6V24-4GCX06M-5/2/5aa3be599488d5718d9144fcc080d91c>)

Abstract:

Bacillus subtilis strain B10 was isolated for degumming of ramie blast fibers, and a fragment of 642-bp was amplified from chromosomal DNA by using primers directed against the sequence of Bacillus subtilis xylanase gene given in GenBank. The positive clones were screened on the selected LB agar plates supplemented with xylan by Congo-red staining method. The recombinant plasmid from one positive clone was used for further analysis and DNA sequencing. The gene sequence is different from the reported xylanase gene sequence in sites of two base pairs. The recombinant plasmid was expressed in Escherichia coli, and xylanase activity was measured. The xylanase distribution in extracellular, intracellular and periplasmic fractions were about 22.4%, 28.0% and 49.6%, respectively. The xylanase had optimal activity at pH 6.0 and 50 [degree sign]C.

Keywords: Xylanase; Gene cloning and expression; Sequence analysis; Bacillus subtilis; Escherichia coli

D.C. Sharma, T. Satyanarayana, A marked enhancement in the production of a highly alkaline and thermostable pectinase by Bacillus pumilus dcsr1 in submerged fermentation by using statistical methods, Bioresource Technology, Volume 97, Issue 5, March 2006, Pages 727-733, ISSN 0960-8524, DOI: 10.1016/j.biortech.2005.04.012.

(<http://www.sciencedirect.com/science/article/B6V24-4G9Y4GY-7/2/b3b188a90e00564cd101367d94fca15b>)

Abstract:

The production of a highly alkaline and thermostable pectinase of Bacillus pumilus was optimized in submerged fermentation using Plackett-Burman design and response surface methodology. Three fermentation variables (C:N ratio, K₂HPO₄, and pH), which were identified to significantly affect pectinase production by Plackett-Burman design were further optimized using response surface methodology of central composite design (CCD). An over all 34- and 41-fold increase in enzyme production was achieved in shake flasks and lab fermenter by the optimization of variables using statistical approaches, respectively. The enzyme was optimally active at pH 10.5 and 50 [degree sign]C, and selectively degraded only the noncellulosic gummy material of ramie (Boehmeria nivea) fibres causing 10.96% fibre weight loss, and therefore, the enzyme could find application in fibre processing industry. The use of the enzyme in fibre processing reduces the use of alkali, and the associated alkalization of water bodies.

Keywords: Bacillus pumilus dcsr1; Alkaline pectinase; Medium optimization; Plackett-Burman design; Response surface methodology; Degumming

Yongshang Lu, Lihui Weng, Xiaodong Cao, Morphological, thermal and mechanical properties of ramie crystallites--reinforced plasticized starch biocomposites, Carbohydrate Polymers, Volume 63, Issue 2, 3 February 2006, Pages 198-204, ISSN 0144-8617, DOI: 10.1016/j.carbpol.2005.08.027.

(<http://www.sciencedirect.com/science/article/B6TFD-4H8FPTX-1/2/e61e57e9f9ffa3f01ac779eab0c424b5>)

Abstract:

A series of environmentally friendly glycerol plasticized starch (PS) biocomposites were successfully prepared, using ramie cellulose nanocrystalites (RN) of 0-40 wt% as fillers. The ramie cellulose nanocrystalites, having lengths of 538.5125.3 nm and diameters of 85.425.3 nm on average, were prepared from ramie fibers by acid hydrolysis. The morphology, thermal behavior and mechanical properties of the resulting composites were investigated by scanning electron microscopy, differential scanning thermal analysis, dynamic mechanical thermal analysis, and measurements of mechanical properties and water absorption. The results indicate that the synergistic interactions between fillers and between filler and PS matrix play a key role in reinforcing the composites. The PS/RN composites, conditioned at 50% relative humidity, increases, respectively, in both tensile strength and Young's modulus from 2.8 MPa for PS film to

6.9 MPa and from 56 MPa for PS film to 480 MPa with increasing RN content from 0 to 40 wt%. Further, incorporating RN fillers into PS matrix also leads to a decrease in water sensitivity for the PS based biocomposites.

Keywords: Starch; Cellulose nanocrystalites; Biocomposite; Ramie