

## INDEX

- Acid hydrolysis, 371  
acid and enzymatic, 532  
at high temperature, 723  
enzymatic, 655  
of lignocellulose, 723, 726  
of lignocellulosic biomass, 717  
of lignocellulosic material, 679, 680, 682, 687
- Acid  
acrylic, 770  
dicarboxylic acids: fumaric acid, 769  
lactic, 769  
levulinic (AL), 768, 769
- Agricultural greenhouses, 312
- Agricultural management, 506  
processes, 511-513
- Agricultural practices for soil sustainability, 385
- Agricultural tractor, 453
- Agro-environmental Protocol (State of São Paulo), 181  
agro-environmental protocol and details of burning (INPE), 22  
ecological-economic zoning and the creation of new conservation units, 24  
harvest 2005/2006, 23  
harvest 2006/2007, 23  
harvest 2007/2008, 23  
harvest 2008/2009, 23  
reduction in food (grain or meat) producing areas, 41
- Agroindustrial productivity, 312
- Agro-industrial residues, 499
- Alcohol fuel, 125, 806
- Alcoholchemistry, 25
- Aldehydes, 191
- APTA, 64, 65
- Area(s)  
agricultural, 487  
industrial, 489  
occupied and yearly production by annual cultures in Brazil, 305  
suitable for sugarcane cultivation, 306
- Automation in the agricultural process, 478
- Bagasse dryers, 588
- Bagasse  
and straw in obtaining ethanol, 556  
in electricity generation, 778, 779  
in the production of ethanol via thermo-chemical conversion, 779  
indicators vs. availability of, 310  
of Brazilian sugarcane, 766
- Balance of  
energy and GHG emissions in ethanol lifecycle, 291  
energy for different technology options, 780  
energy in anhydrous ethanol production (MJ/t cane), 292
- Bale  
cotton, 496  
round, 496
- Baled sugarcane trash, 645, 651, 653, 656
- Best Project – *Bioethanol for Sustainable Transport*, 843
- BIG-GT, 930
- Biochemical route, including enzymatic catalysis and fermentation, 614
- Biodiesel and glycerin, 667
- Biodiesel in the Barralcool Mill, 667
- Biodiesel plants vs. non-integrated plants, 676
- Biodiesel-Bioethanol, 665, 667
- Biodiversity, 180
- Bioecological studies of primary and secondary pests, 447
- Bioenergy  
data bank in, 69  
energy, 751  
legal discussions, 157
- Biofuels and agricultural engines functioning, 66
- Biofuels in Brazil  
challenges in research, development and innovation, 27  
evolution of the sugarcane industry in São Paulo state, 53
- Biofuels production  
air pollution, 178  
ground carbon stocks, 178  
in areas of high biodiversity, 178  
in Latin American countries, 138  
land rights, 178  
soil degradation, 178  
water resources, 178  
workers rights and working relationships, 178
- Biofuels  
specification and normalization of, 808
- Biological and chemical control, 447
- Biological instabilities, 442
- Biomass conversion plants, 728
- Biomass efficient recovery, 472
- Biomass, 718, 719, 762
- Biorefinery, 763, 764, 773  
lignocellulosic, 764, 765  
of sugarcane, 762  
sugar-alcohol-chemical, 115
- BIPLOT, 348, 350
- Blum (*Brazilian Land use Model*), 307, 308  
major BLUM applications, 308, 309
- Boilers, 586
- Brazilian agribusiness, 63  
farming and cattle raising production, 63
- Brazilian alcohol  
business agreements and future markets, 131  
supplying capacity of, 131
- Brazilian Association for Technical Norms – ABNT, 802
- Brazilian distilleries, 21
- Brazilian ethanol exports, 130, 787  
outlook for, 129, 794
- Brazilian model for land use (Blum), 305
- Breeding methods, 333
- Briquette, 496
- Briquetting and torrefaction, 654
- BTL technologies, 741  
biochemical technologies, 754
- BTL  
technologies, 741  
budget and financial resources are not always sufficient, 66  
motivation, training and professional updating for technical and support board, 66  
need for modernization of the infrastructure, 66  
new juridical model that ensures more administrative autonomy and self-management of the technological and physical patrimony, 66  
replacement of the support and administrative staff board, 66
- Burning of sugarcane, 181
- Cane-pasture, 311
- CARB, 296
- Carbohydrates, 698
- Carbon  
Ceq, in the agricultural phase of ethanol production, 208, 212  
in the soil, 207
- Cassava in Brazil, 521-523
- Caster oil plant program, 69
- Caterpillar of *Diatraea saccharalis*, 446
- Cellulose (glucose), 768, 723
- Centro de Tecnologia Canavieira (CTC), xxxiii
- Centro Nacional de Referência de Biomassa (Cenbio), xxxiii
- Certification by INMETRO, 180
- Cetesb Decision n. 023/00/C/E, of 06/15/2000, 429
- Cetesb Management Decision n. 014/01/E, of 07/26/2001, 429
- CH<sub>4</sub> and N<sub>2</sub>O flow during vegetal biomass burning, 211
- Challenges of instrumentation and automation for the sector, 478
- Chemical and physical methods, 690  
extraction with solvents, 690  
removal by evaporation and distillation, 690  
treatment with alkaline-terrous hydroxides, 690  
use of ionic exchange resins, 690  
use of zeolites, 691
- Chemical route, acid hydrolysis of biomass, production of poly (lactic acid), 614
- Chopped bulk, 494
- Cluster, 18
- CO<sub>2</sub>  
total emission of, 397
- Code of Waters, 428
- Combustion in boilers, 651
- Commercial barriers, 130
- Conjugate transportation, 501  
transportation of, 469  
trash recovery systems, 494
- Control in the agroecosystem, 447
- Controlled traffic, 321
- Corn, 519, 722  
production in some countries, 521  
cost of collection, 758

- Costs  
 comparison of transportation modes, 796  
 of production of second generation biofuels, 759  
 of trash recovery and transportation, 643, 644  
 social costs of air pollution, 192
- Cramer report, 179
- Criatec program, 79
- Criatec, 79
- Crop rotation – green fertilization, 389
- Crude oil refinery, 123
- CSR, 885  
 reception, preparation and juice extraction, 563
- CTEI  
 for the sustainability of ethanol, 220
- Culms, 362
- Cultivation  
 of cane by region, 870  
 of cane in an organic production system, 388
- Decree n. 2 455, of January 14, 1998, 801
- Decree n. 24 643, of 07/10/1934, 428
- Decree n. 32 955, of 06/07/1991, 429
- Decree n. 41 719, of 04/16/1997, 429
- Decree n. 8 468, of 09/08/1976, 428
- Decree-Law n. 1 413, of 08/14/1975, 428
- Demand  
 future demand for sugarcane ethanol in Brazil, 305  
 potential global demand of alcohol for motors, 128
- Diatraea saccharalis*, 444
- Diesel and biodiesel mixes and durability of engines, 70
- Diesel engine powered by ethanol, 844, 845
- Diesel oil  
 consumption, 491
- Direct agricultural labor, 508
- Discussion about cane, 286, 288
- Distillation, 550
- Distribution and use of water in Brazil, 272
- Donnelly chute at the 1<sup>st</sup> mill inlet, 564
- Drainage gullies, 143
- Dry cleaning stations, 469
- E. lignosellus*, 447
- EU Directive, 294
- Economic analysis of cellulase production  
 methods for bioethanol, 729
- Economic background, 125
- Eggs of *D. saccharalis*, 446
- Electricity, 37  
 average number of cuts (index), 59  
 average, 59  
 basic research in sugarcane/ethanol, 151  
 elimination of burning, 22  
 energy contained in, 20  
 energy efficiency improvement, 582  
 expansion of sugarcane, 23  
 generation of, 577  
 genomics, xxxi  
 gradual elimination of manual harvesting, 22  
 improvement and technologies for growing and harvesting sugarcane, xxxi  
 in organic and agro-ecological management, 141  
 increase the cogeneration of electricity  
 production, 21  
 introduction of 2<sup>nd</sup> generation technologies, 24  
 Law n.11 241/2002, 22
- Elephant Grass program, 69
- Embrapa agro-energy, 82
- Emission(s)  
 average emissions from vehicles approved by Proconve, 244  
 avoided by the use of ethanol, 294, 297  
 due to direct land use change for raw sugarcane, 294  
 of GHG, 179, 295-298, 315, 780  
 of pollutants, 187  
 Direct employment, 49
- Energy cane, 755
- Energy comparison  
 between three cane varieties, 756  
 international, 82, 83, 84
- Energy integration in sugar and ethanol production, 596
- Energy sources  
 renewable and non-renewable, 9
- Energy  
 electricity surplus, 775  
 in Brazil, 9  
 modern technologies of mechanization that cause low impact, 12  
 new industrial models that allow, in addition to ethanol, generate more electricity and inputs to the petrochemical industry, 13  
 of the mills, 572  
 primary energy from sugarcane, 753
- Engineering  
 financial engineering and business simulation models, 227  
 mutation or genetic engineering; culture media, 95  
 of enzymes, 373
- Engines  
 alcohol-fueled, 836, 839  
 gasoline-powered, 830
- Environmental issues, 283, 286
- Environmental legislation, 472
- Environmental licences, 181
- Environmental management, 234
- EPA, 296
- Erosion, 384
- Etamax D, 845
- Ethanol fuel analysis  
 chromatographic methods proposed for, 814  
 electrochemical methods proposed for, 819  
 spectroscopic methods proposed for, 816
- Ethanol pipelines  
 construction of, 23
- Ethanol production  
 from lignocellulosic materials, 698  
 from starch, 614  
 integrated biodiesel plants vs. non-integrated plants, 676  
 integrated production of sugar and ethanol, 572  
 sugar and cane in Brazil (1975-2008), 5  
 world production of biodiesel and ethanol, 851  
 world production of bioethanol, 129  
 world production of sugarcane and ethanol, 868  
 world productivity of grain and sugarcane, 452
- Ethanol productive chain  
 coordination, 227
- Ethanol yield from different raw materials, 520
- Ethanol  
 and the vehicular emission of pollutants, 187  
 and alcohol chemistry, 766  
 and biodiesel in Brazil, 788  
 anhydrous, 292, 293  
 Brazilian needs, 13  
 cellulosic, 365, 366  
 chemical products obtained from, 120  
 comparison of crude oil refineries and biorefineries, 122  
 distribution, 788  
 emission  
 average emission of CO for new vehicles, 188  
 average emission of CO, 189  
 average emission of HC for new vehicles, 189  
 average emission of NO<sub>x</sub> for new vehicles, 190  
 final use of, 829  
 first generation, 369, 711  
 fourth generation, 375, 377  
 fuel ethanol quality, 813  
 fuel, 804  
 fuel, anhydrous and hydrous, 570  
 hydrated, 57  
 improvements in fermentation, 20  
 increase in volume of sugarcane, 20  
 instruments to foster R&D, 73  
 latin american energy integration, 133  
 logistics for transport, 785  
 mapping the technological chain of production, 87  
 production and storage, 786  
 production of, 547  
 productivity in the production (liters/ha/year), 20  
 quality control, 820  
 raw material quality, 553  
 regulatory framework, 801  
 scenarios for emission in the RMS, 188  
 second generation ethanol production process, 121  
 second generation, 370  
 strategy of Brazil for, 17  
 strategy of São Paulo for, 19  
 technological evolution of, 561  
 third generation, 372  
 use in diesel-cycle engines, 841  
 use in transesterification, 853
- Evolution  
 of bagasse boilers efficiency, 588  
 of ethanol and stillage production over the years, 424  
 of ethanol production in Brazil, 313  
 of mechanized harvesting for sugarcane, 245  
 of sugarcane areas, 51  
 of sugarcane cultivation in Brazil, 305  
 of the sugar-ethanol sector, 279
- Fast pyrolysis as a precursor of BTL, 733
- Fast pyrolysis plant PPR-200, installed at FEAGRI-UNICAMP, 928
- Fermentation, 566-568  
 of sucrose, 369  
 of the hydrolyzed lignocellulosic material, 680
- Fertilization, 392, 407  
 environmental aspects of, 414
- Final uses of water in the industrial phase of ethanol production, 273
- First and second generation bioethanol, 711
- First generation technologies, 19
- Floodplains  
 with herbaceous plants, 143  
 with riparian forests, 143
- Food vs. Fuel, 101
- Forestry (Forestry) code, 428
- Forests  
 exotic, 143  
 mixed forests undergoing regeneration, 143  
 native, 143  
 restored native, 143  
 undergoing spontaneous regeneration, 143
- Fuel anhydrous ethanol, 802, 803, 806
- Fuels, 39  
 alternative, 832  
 commerce, 807  
 ligno-cellulosic derived products, 777  
 through the thermo-chemical route, 932
- Functional foods, 770
- Functional structures and structures for process, 511
- Fungi  
 green muscardine fungus *Metarhizium anisopliae*, 446  
 search, selection and engineering of fungi and enzymes, 373
- Funtec, 80
- Furfural, 770
- Gaseous phase chromatograph and gas flow schematics, 210
- Gases emitted from trash and the soil, 210
- Gasification and synthesis plants, 933
- Gasification, 654, 582
- Gasoline, 831  
 gasoline-Alcohol, 833
- GCC of a thermally integrated mill, 600
- Generating the population with genetic variation, 334  
 competition trials, 336  
 evaluation of clones in experiments, 335  
 selection and cloning in the early stages, 334
- Genetic mapping, 336
- Geo-technology applications, 514
- Gini index, 266
- Global supply/demand of ethanol, 306
- Glucuronarabinoxylans  
 cross-linked, 369
- Governance of the sugar & alcohol sector, 231
- Grant of a patent or a plant varieties registration, 76
- Greenfields in the state of São Paulo - 2005 to 2008, 57
- Gross income, 49
- Gypsum and phosphate application, 390
- H. taltula*, 447
- H<sub>2</sub>/CO for different synthesis processes, 931
- Harvest, 441, 461  
 integral, 493

- manual, 487
- mechanical, 447, 488, 489
- monitoring, 484
- mowing, 93
- without previous burning, 473
- Harvester
  - feeding, 472
- Hemicellulose (xylose), 769
- Hemicellulose of plant cell walls, 368
- Hemicellulose, 721
- Hydrolysis technologies, 731
- IAC cane program, 66
- Impacts
  - environmental impacts of wastes derived from ethanol production, 70
  - local and global, 41
  - of sugarcane cultivation on soil, 381
  - of sugarcane cultivation on the environment, 243
  - of sugarcane cultivation on the fauna, 243
  - over food supply, 180
  - social, economical and territorial, 49
- Incorporation of straw for the reduction of water stress, 275
- Innovation
  - bioenergy technological, 63
  - technological, 79
- Inputs
  - solid and liquid, 484
- Instituto de Pesquisas Tecnológicas (IPT), xxxiii
- Integration with heat and power plant, 710
- Intellectual property and technological management, 227
- International analysis, 294
- International patent classification, 94
- Investment
  - venture capital, 78
- IPC
  - classifications indicated in the work, 93
- Juice
  - direct, 136
  - treatment system, 565
- Knowledge spiral, 116
- Labor relations, 282, 283
- Laboratório Nacional de Ciência e Tecnologia do Bioetanol (CTBE), xxxiii, 82
- Land ownership issue, 281
- Land usage and changes in land usage in Brazil, 41, 304, 305
- Latin America
  - potential and evolution of the production of ethanol in, 134
- Law enforcement prohibiting cane burning in Brazil, 639
- Law n. 4 771, of 09/15/1965, 428
- Law n. 5 966, of December 11, 1973, 801
- Law n. 6 134, of 06/02/1988, 428
- Law n. 6 171, of 07/04/1988, 429
- Law n. 7 641/91, 428
- Law n. 9 605, of 02/12/1998, 429
- Law n. 997, of 05/31/1976, 428
- Leaf frog hopper, *Mahanarva posticata*, 443
- Leafhoppers, 443, 445
- Lignin, 721, 767
- Lignocellulosic material, 679, 697, 719, 720
- Liming and gypsum, 390, 391, 405
- Loading of whole stalk sugarcane, 488
- Losses in harvesting, 276
- Low-emission public transport
  - traffic engineering of urban vehicles, 186
- M. fryanus*, 445
- M. posticata* (c.), 446
- Mahanarva fimbriolata* (c.), 446
- Management of sugarcane cultivars, 350
- Mapping of land usage and coverage in 1988 and 2003, 48
- Mash
  - juice, 425
  - mixed, 425
  - molasses, 425
- Mathematical modeling, 797
- MBI (Low Impact Mechanization) for sugarcane production, 321
- Mechanization, 451
  - traditional, 471
- Methane
  - in burned and unburned cane systems, 211
- Microhymenopteran, 446
- Micronutrients, 412
- Migdolus fryanus*, 445
- Milling capacity, 564
- Milling extraction, 565
- Milling, 506, 564
- Ministry of Internal Affairs Directive n. 124, of 08/20/1980, 428
- Ministry of Internal Affairs Directive n. 158, of 11/03/1980, 428
- Ministry of Internal Affairs Directive n. 323, of 11/29/1978, 428
- Mitigation of global warming, 204
- Molecular technologies, 884
- N<sub>2</sub>O from soils, 211
- National Institute of Metrology, Standardization and Industrial Quality, 801
- New technologies
  - government investments, 474
  - in mitigation for water use in the production of ethanol, 274
- Nitrogen and other macronutrients, 524, 525
- Nitrogen and other nutrient losses to the environment, 414
- Nitrogen, 407
- Nitrous oxide flow in burned and unburned cane systems, 212
- Non-refundable facilities
  - partnerships with ICTs, 78
- Nutrient recycling, 397
- Official programs supporting Brazilian sugarcane and ethanol, 7
- Oil for biodiesel production, 674
- Oil
  - degummed (soya, sunflower, rapeseed), 669
- Operations
  - traditional agricultural operations and their consequences, 381
- Optical isomers from a racemic mixture, 93
- Optimization of energy recovery systems, 593
- Organic sugarcane fields, 142
- Pappe – Programa de Apoio à Pesquisa em Empresas, 78
- Parasitoids, predators, and entomopathogens, 447
- Participative methods, 219
- Patent applications in the period between 1974 and 2006, 94
- Patents in the ethanol production chain, 88
  - distribution of patent documents filed in Brazil, 90
  - distribution of the main classifications (CIP), 92
  - distribution of the mais applicants of patent documents in Brazil, 91
  - evolution of the number of patent applications from 1974 to 2006, 89
- Pathogens produced in the laboratory, 447
- Pellet, 496
- Pest monitoring, 447
- Pests and diseases profile, 276
- Pests, 444, 447
  - control alternatives, 444
- Petrobras Bioethanol Project, 82
  - projects under development in the world using BTL technology, 745
- Petroleum and biofuels, 130
- Petroleum industry, 130
- Pheromones, 448
- Phosphorus, 409
- Physic nut program, 69
- Physiological, biochemical and molecular mechanisms to improve the access to cellulose, 374
- Physiology and microbial ecology, 548
- Phytotechnology, 66
  - generic flowchart of BTL process, 743
- Pipeline transport, 500
- Planting, 460
  - sowing; fertilising, 95
- Pollution
  - air pollution in the São Paulo metropolitan region, 192
  - vehicular, 186
- Polyhydroxyalkanoates, 614
- Potassium, 409
- Potential for sugarcane production
  - with irrigation, 302
  - without irrigation, 302
- Power generation, 775
  - electric energy generation through pyrolysis and gasification, 922
  - of mills for the different configurations evaluated, 778
- Precision agriculture, 477, 514
- Present scientific and technology capabilities, 916
- Problems
  - phytosanitary, 350
  - quarantine, 442
- Process
  - biostil, 624
  - exploratory or normative, 219
  - industrial process of production of ethanol, 275
  - lignocellulose conversion, 726
  - of fast pyrolysis, 733
  - of fermentation, 93
  - of innovation, 122
  - of second generation, 759
- Processing
  - of lignocellulosic biomass to obtain bioethanol, 730
- Process-required for mechanical, electric and thermal energy, 586
- Proconve – the Motor Vehicle Air Pollution Control Program, 186
- Production environments for sugarcane, 385
- Production of sugar, ethanol and energy, 870
- Production
  - of fuels, 776
  - of liquid fuels and electricity, 580
- Production
  - with irrigation, 302
  - without irrigation, 302
- Program of biological control of pests
  - in sugarcane, 70
- Programs regulated by the National Environmental Council, 186
- Project-based learning, 120
  - for innovation process, 122
- Projections of global supply/demand of ethanol, 306
- Prospection of institutional innovation demands, 220
- Pyrolysis of wood (dry basis), 734
- Pyrolysis, 652
- Pyrolysis/gasification/catalytic synthesis route for the production of biofuels, 934
- Pyrolysis/Gasification/Synthesis - BTL, 921
- QTL mapping, 337
- Quantification of land coverage in 1988 and 2003, 47
- R&D in sugarcane and ethanol in Brazil
  - history of, 11
- Raw material
  - for producing ethanol, 537
  - of fuel processing, 729
  - processed at PPR-200, 734
- Recoverable sugar
  - extraction of, 20
  - increase in, 19
- Refundable credit facilities, 77
  - developed in partnership with universities, research institutions, and/or other companies, 77
  - financial instruments, 76
  - programs of the Ministry of Science and Technology, 77
  - technology density and dynamic production chains, 77
  - that increase the R&D activities in the country, 77
  - to increase the company's competitiveness, 77
- Remote sensing
  - geographic information system, 514
- Research and development
  - CSLL, 76
  - instruments to incentive, 74
  - international experience, 75
  - support instruments for R&D, 73
  - tax incentives, 75

- Research into precision agriculture, automation, and instrumentation, 484
- Research  
 challenges and needs, 415
- Research, in the short term, to synthesize pheromones for *S. levis* and *D. saccharalis*, 448
- Researchers, 66
- Residues recycling, 415
- Resolution CNRH n. 15, of 06/01/2001, 429
- Resolution Conama n. 0001, of 01/23/1986, 428
- Resolution Conama n. 0002, of 06/05/1984, 428
- Resolution Conama n. 357, of 03/17/2005, 429
- Resolution n. 42, 11.24.2004, 673
- Robotics  
 agricultural robotics, 481-482
- Root froghopper, 70
- Root froghopper, *mahanarva fimbriolata*, 443
- Roundtable on Sustainable Biofuels, 178
- RTFO, 295
- S. levis*, 447
- S. officinarum*, 325, 354
- Saeman model, 724
- Sales/marketing, 118
- Sandy middle texture latosol, 392
- Scenarios  
 alternative scenarios evaluated by CARB, 296  
 bioenergy and impacts of sugarcane production expansion, 220, 221
- Second generation technologies, 312, 754, 755
- Seedbed preparation, 457
- Simultaneous saccharification and fermentation of lignocellulosic material, 614
- Soil and plant sampling and monitoring, 484
- Soil fertility and the longevity of sugarcane crops, 382
- Soil losses due to erosion in sugarcane, 385
- Soil resistance to penetration, 454
- Soil subsurface layer, 386
- Soil surface in sugarcane areas harvested with and without trash burning, 205
- Soil, 385  
 conservation, 387
- Spacing of cane rows, permanent plots and controlled traffic, 387
- Specific programs  
 Bioen, 81  
 other agencies, 82  
 partnerships, 81
- Spittlebug, 70
- Stalks, 487
- Steam boilers with multiple fuels, 582
- Stillage  
 and agribusiness sustainability, 436  
 and environmental issues, 434  
 concentrated and biodegraded, 430  
 for optimized production, 430  
 from molasses mash, mixed mash, and juice mash, 425  
 in various Brazilian regions during the 2003/2004 harvest, 434  
 natural, 432  
 physicochemical characteristics of, 426  
 total emission of, 424
- Stocks  
 C stocks and C/N ratios in biomass, 207, 314  
 carbon stocks, 207
- Strategy  
 and essential competencies, 116  
 competitive, 118  
 varietal management, 69
- Straw and soil protection, 458
- Straw recovery, 466
- Sucrose, 774
- Sugar and alcohol mill, 663
- Sugar mix per area, 58
- Sugar  
 manufacture, 135
- Sugar-alcohol industry  
 alcohol chemistry and biorefineries, 761
- Sugar-alcohol-chemical chain, 118
- Sugarcane borer and  $b_2$ , 446
- Sugarcane borer, *D. saccharalis*, 441
- Sugarcane cell walls, 369
- Sugarcane cell walls, 369
- Sugarcane entomofauna, 441
- Sugarcane ethanol chain  
 instrumentation and automation in the agroindustry, 603  
 sugarcane trash, 639
- Sugarcane germplasm, 356
- Sugarcane green leaves, 646-648
- Sugarcane industry, 863
- Sugarcane pests, 447
- Sugarcane producer of the state of São Paulo, 507
- Sugarcane production per region, 55-57
- Sugarcane production, 282
- Sugarcane production; sustainability, 474
- Sugarcane residual biomass, 774
- Sugarcane residues - SAR, 645
- Sugarcane retraction, permanence, and expansion, 44
- Sugarcane straw  
 chemical and morphological composition of, 647, 649
- Sugarcane trash in a biomass fast pyrolysis plant pilot, 926
- Sugarcane  
 1<sup>st</sup> to 5<sup>th</sup> cut, 59  
 areas with natural vegetation, 41  
 cross section of a leaf, 359  
 raw, 322  
 in the big mills, 466  
 sugarcane, 621, 625, 629, 630, 633
- Sugarcane-ethanol  
 agricultural and industrial productivity, 13  
 assure the means to acquire renewable energy sources, 13  
 development of emerging technologies, 13  
 full use of the sugarcane resources, 12  
 newer and more sustainable agricultural model, 12  
 research, 13  
 resources and inputs, 13
- Sulfur level, 186  
 thermochemical, 754
- Sulfur, 409
- Sustainability and water use, 271
- Sustainability in the sugar & alcohol sector, 220, 221
- Sustainability  
 in sugarcane, 447  
 of biofuels, 174  
 California state government, 177  
 directives of European Union, 176  
 initiatives aiming at, 176  
 international initiatives, 176  
 Renewable Transport Fuels Obligation, 177  
*T. licus*, 447
- Sustainable use of the soil, 472
- Sweet potato (*ipomoea batatas*), 528-34
- Sweet sorghum, 534
- Synthesis gas  
 methanol synthesis, 932  
 synthesis of biomass gasification, 755  
 synthesis of combustion engines, 931
- Synthetic map of land usage and coverage in 1988, 45, 46
- System  
 dry washing, 275  
 Façon, 672  
 intelligence, 219  
 of cultivation, 442  
 of trash recovery, 494  
 push-rake, 471  
*soldier* (Louisiana), 462, 471
- Tanker trucks, 797
- Taro (*Colocasia esculenta*), 528
- Taxes  
 devaluation and amortization, 76  
 direct, 50  
 income tax on money transfers abroad, 76  
 reduction of, 76  
 royalty payments, 76
- Technological development in the production of ethanol, 563
- Technological needs and capabilities, 897
- Technological roadmapping for sugarcane ethanol agricultural component, 897  
 Brazilian ethanol, 4  
 development and innovation of ethanol, 937  
 genetic breeding and biotechnology component, 883  
 hydrolysis component, 909  
 perspectives of ethanol production expansion, 5  
 public policy strategies for ethanol, 1  
 thermoconversion component, 919
- Technology drivers, 892, 915  
 of "cost" CSR, 894, 906  
 of "environment" CSR, 895, 907  
 of "productivity" CSR, 893, 906
- Technology fund - Funtec, 79
- Technology roadmapping, 863
- Telecommunications, 515
- Temperature ranges, indicating process flows, 596
- Termites, 444, 445
- Thermo-chemical route, which includes the processes of biomass pyrolysis, gasification, 614
- Traditional and secondary pests, 447
- Transesterification of a triacylglyceride, 854
- Transgenics compatible with Brazil's reality, 448
- Transport by tanker trucks, 499
- Transportation, 489
- Trash decomposition, 459
- Trash deposition over the soil, 181
- Trash on soil, 394
- Trash recovery, 495, 496
- Trash, 482, 492, 493  
 storage, 496
- Trichogramma galloi*, 446
- UNICAMP (PPR-200) fast pyrolysis plant scheme, 925
- Use of the soil and biodiversity, 250
- Use of waste, 397
- Use of whole sugarcane, 13
- Variation in yields of sugarcane, 393
- Vegetal biomass  
 deposits, 206  
 during harvest, 205  
 in the soil, 204  
 productivity, 205
- Vehicles  
 combination vehicle load - CVC, 490  
 light vehicles and ethanol consumption (hydrated and anhydrous), 6
- Vinasse, 499-501  
 biodigestion of, 582
- Water losses during evaporation, 274
- Water losses in soil, 460
- Water recycling is required, 181
- Waterways  
 Madeira, 795  
 of Araguaia-Tocantins, 794  
 São Francisco, 795  
 Taquari-Jacuí, 795  
 Tietê-Paraná, 795
- Ways of applying stillage in various Brazilian regions during the 2003/2004 harvest season, 435
- Xylitol, 771
- Xylose and glucose of corn stover, 722
- Yam (*Dioscorea alata*)
- Yeast  
 thermophilic and osmophilic, 559
- Zoning  
 agro-ecologic zoning in São Paulo, 181  
 agro-environmental zoning for sugarcane in Brazil, 304