KOMODITAS : JARAK PAGAR

PROQUEST 2006-2010

PLANT PROPAGATION (1 JDL)

Propagation Potentials of Genotypes and Different Physiological Ages of Stem Cuttings in Jatropha curcas/ L. A K M Aminul Islam, Zahira Yaakob, Nurina Anuar, Mohamad Osman.
Journal of Agricultural Science. Toronto:Dec 2010. Vol. 2, Iss. 4, p. 75-82 (8 pp.)
Abstract:

Propagation potentials of stem cuttings of different physiological ages and genotypes of physic nut (Jatropha curcas L.) were studied at UKM, Malaysia. Stem cuttings of the different physiological ages (hardwood, semi hardwood and soft wood) taken from five selected genotypes of Jatropha were planted in soil media (top soil). Data were collected on the attributes of the stem cuttings and then analyzed using computer based software, SAS, version 9.01, (2008). The study showed significant variability in shoot and root development and growth of shoots of the three physiological ages of cuttings and five genotypes. Semi hardwood stem cuttings had lower days to opening of new bud and shooting (4.8 and 11.7 d, respectively) as well as higher percentage of sprouted and rooted cuttings of 100% and 98.5%, respectively. Soft wood cuttings took more days to opening of new bud and shoot development in all five genotypes. Soft wood cuttings also showed lower percentage of rooted cuttings. Semi hard wood cuttings proved to be more suitable for the vegetative propagation of Jatropha curcas through stem cutting, which gave more than 98% success. Genotypic differences were observed in shooting and rooting of Jatropha. Genotype JC 14 performed better in all three types of cutting compared to other four genotypes. [PUBLICATION ABSTRACT]

Early recognition of graft compatibility in Uapaca kirkiana Müell Arg. clones, provenances and species/ Simon A Mng'omba, Elsa S du Toit, Festus K Akinnifesi.
Agroforestry Systems. The Hague:Oct 2008. Vol. 74, Iss. 2, p. 173-183
Abstract:

Examination of callus micro-grafts in Uapaca kirkiana Müell Arg. was carried out with the objective of determining early signs of graft compatibility. Leaves from U. kirkiana, U. nitida and Jatropha curcas trees were used for callus induction. Two pieces of callus were co-cultured on Murashige and Skoog (MS) medium with different supplements. Co-cultured calli were embedded in paraffin wax and dissected. The specimens were stained in safranin and fast green before viewing under a light microscope. Results showed that MS medium with 0.1 mg l-1 thidiazuron (TDZ) and 0.5 mg l-1 naphthaleneacetic acid (NAA) or 1.0 mg l-1 dichlorophenoxyacetic acid (2,4-D) and 0.5 mg l-1 NAA was effective for callus induction. There were no necrotic layers at the unions within U. kirkiana clones and provenances, but a differential growth

(irregularity) between U. kirkiana and U. nitida co-cultured calli. Phenol deposits were observed at the union interfaces of U. kirkiana combinations and were high on calli derived from mature trees. Phenol deposits were absent at the union of J. curcas heterografts. Necrotic layers developedat the unions of U. kirkiana and J. curcas micro-grafts and indicating an outright graft incompatibility. Accumulation of phenol deposits at the union interfaces inhibited graft compatibility in many U. kirkiana combinations. Callus fusion technique can be used to identify partners with an outright graft incompatibility, especially for distant related plant species. [PUBLICATION ABSTRACT]

SEED PRODUCTION AND PROCESSING (1 JDL)

Seed inoculation with Bacillus spp. improves seedling vigour in oil-seed plant Jatropha curcas L./ S Desai, Ch Narayanaiah, Ch Kranti Kumari, M S Reddy, S S Gnanamanickam, G Rajeswara Rao, B Venkateswarlu.
Biology and Fertility of Soils. Berlin:Oct 2007. Vol. 44, Iss. 1, p. 229-234
Abstract:

Jatropha (Jatropha curcas L.) is a non-edible oil-seed plant with adaptability to marginal semi-arid lands and wastelands. The Indian Government is promoting jatropha to reduce dependence on the crude oil and to achieve energy independence by the year 2012, under the National Biodiesel Mission. Selected strains of Bacillus spp., either supplemented with or without chitin, were tested for their ability to promote growth of jatropha seedlings in pot culture studies. The strains supported growth of jatropha seedlings up to 42 days after sowing. Among all strains, Bacillus pumilus (IM-3) supplemented with chitin showed over all plant growth promotion effect resulting in enhanced shoot length (113%), dry shoot mass (360%), dry root mass (467%), dry total plant mass (346%), leaf area (256%), and chlorophyll content (74%) over control. Treating seeds with strain IM-3 without chitin resulted in enhanced dry shoot mass (473%), dry total plant mass (407%), and chlorophyll content (82%). However, Bacillus polymyxa (KRU-22) with chitin supported maximum root length (143%). Either strain IM-3 alone or in combination with other promising strains could be promoted further for enhanced initial seedling growth of jatropha.[PUBLICATION ABSTRACT]

PLANT GENETICS AND BREEDING (6 JDL)

Molecular Markers Reveal Limited Genetic Diversity in a Large Germplasm Collection of the Biofuel Crop *Jatropha curcas L*. in Brazil/ Tatiana B Rosado, Bruno G Laviola, Danielle A Faria, Marilia R Pappas, Leonardo L Bhering, Betania Quirino, Dario Grattapaglia.
Crop Science. Madison:Nov/Dec 2010. Vol. 50, Iss. 6, p. 2372-2382 (11 pp.)
Abstract

The genetic diversity of a comprehensive germplasm collection involving 192 *Jatropha curcas* L. accessions collected throughout Brazil, spanning a wide latitudinal

range from the states of Maranhão (1°49' S, 44°52' W) to Rio Grande do Sul (29°33' S, 55°07' W), was studied with 96 random amplified polymorphic DNA (RAPD) primers and six selected microsatellite markers. Only 23 of the 381 replicated RAPD markers and one microsatellite were polymorphic. Surprisingly, all accessions were homozygous at all but one microsatellite, in contrast with the outcrossing mating system reported for the species, suggesting that J. curcas not only supports selfing butpossibly breeds by geitonogamy. Similarity based clustering revealed only 43 unique multilocus profiles in the 192 accessions. The probabilities of accessions with indistinguishable multilocus profiles being true duplicates varied between 83 and 99%. No relationship between clustering of accessions and geographic origin was observed, suggesting that J. curcas has experienced a widespread dispersion across regions by seeds and possibly vegetative propagules. The narrow genetic base and extent of potentially duplicated accessions likely reflects a recent common ancestry, drift, and intensive selection of the currently cultivated materials since the time of introduction. This result highlights an urgent need for the introduction of new and diverse accessions to this germplasm collection if Brazil is to drive and sustain successful breeding programs. [PUBLICATION ABSTRACT]

Biotechnologizing Jatropha for local sustainable development/ Daniel Puente-Rodríguez.
Agriculture and Human Values. Gainesville:Sep 2010. Vol. 27, Iss. 3, p. 351-363
Abstract:

This article explores whether and how the biotechnologization process that the fuel-plant Jatropha curcas is undergoing might strengthen local sustainable development. It focuses on the ongoing efforts of the multi-stakeholder network Gota Verde to harness Jatropha within local small-scale production systems in Yoro, Honduras. It also looks at the genomics research on Jatropha conducted by the Dutch research institute Plant Research International, specifically addressing the ways in which that research can assists local development in Honduras. A territorial approach is applied for analysis employing a three domain concept (local sustainable biotechnological development) of territory, technology and re-territorialization. The article suggests that, although the biotechnologization process (through genomics) of Jatropha within the socio-technical framework of the institute and multi-stakeholder networks is an ongoing process - and different trajectories are, therefore, still open - the process can, nevertheless, strengthen local sustainable development. [PUBLICATION ABSTRACT]

Investigation on Cross-Compatibility Barriers in the Biofuel Crop *Jatropha curcas L*. with Wild Jatropha Species/ R Senthil Kumar, K T Parthiban, P Hemalatha, T Kalaiselvi, M Govinda Rao.
Crop Science. Madison:Sep/Oct 2009. Vol. 49, Iss. 5, p. 1667-1674 (8 pp.)
Abstract:

Interspecific hybridization in Jatropha species plays a significant role in crop improvement by transferring useful traits such as yield, high oil content, maximum number of seeds, more femaleness, and hard stems for promoting Jatropha as a biofuel

crop. The wide crosses among the species resulted in limited success due to pollen incompatability. Hence, the objective of the study was to assess pre- and postzygotic barriers through pollen-pistil interaction between cultivated Jatropha curcas and other three wild Jatropha species. In this study, the cross J. curcas × J. gossypifolia, even though the pollen tubes reached ovaries after pollination, failed to produce seeds, and the cross between J. curcas × J. podagrica indicated incompatibility signs of bulged pollen tubes coupled with reverse direction of pollen tube growth. The interspecific cross of J. curcas with J. villosa showed crossability barriers of crinkled and twisted growth pattern of pollen tubes and failed to reach ovary. In the case of selfing (J. curcas × J. curcas), pollen tubes reached ovary within
an hour and produced normal seeds. Reciprocal crosses of these species exhibited successful fertilization of pollen tubes, but seed set was very low or no seed set was noticed. [PUBLICATION ABSTRACT]

Genetic analysis of *Jatropha* species and interspecific hybrids of *Jatropha curcas* using nuclear and organelle specific markers/ S D Basha, M Sujatha.
Euphytica. Dordrecht:Jul 2009. Vol. 168, Iss. 2, p. 197-214
Abstract:

The present study aims at characterization of Jatropha species occurring in India using nuclear and organelle specific primers for supporting interspecific gene transfer. DNA from 34 accessions comprising eight agronomically important species (Jatropha curcas, J. gossypifolia, J. glandulifera, J. integerrima, J. podagrica, J. multifida, J. villosa, J. villosa. var. ramnadensis, J. maheshwarii) and a natural hybrid, J. tanjorensis were subjected to molecular analysis using 200 RAPD, 100 ISSR and 50 organelle specific microsatellite primers from other angiosperms. The nuclear marker systems revealed high interspecific genetic variation (98.5% polymorphism) corroborating with the morphological differentiation of the species used in the study. Ten organelle specific microsatellite primers resulted in single, discrete bands of which three were functional disclosing polymorphism among Jatropha species. The PCR products obtained with organelle specific primers were subjected to sequence analysis. PCR products from two consensus chloroplast microsatellite primer pairs (ccmp6 and 10) revealed variable number of T and A residues in the intergenic regions of ORF 77-ORF 82 and rp12-rps19 regions, respectively in Jatropha. Artificial hybrids were produced between J. curcas and all Jatropha species used in the study with the exception of J. podagrica. Characterization of F1 hybrids using polymorphic primers specific to the respective parental species confirmed the hybridity of the interspecific hybrids. Characterization of both natural and artificially produced hybrids using chloroplast specific markers revealed maternal inheritance of the markers. While the RAPD and ISSR markers confirmed J. tanjorensis as a natural hybrid between J. gossypifolia and J. curcas, the ccmp primers (ccmp6 and 10) unequivocally established J. gossypifolia as the maternal parent. Evaluation of backcross interspecific derivatives of cross involving J. curcas and J. integerrima indicate scope for prebreeding and genetic enhancement of Jatropha curcas through interspecific hybridization. [PUBLICATION ABSTRACT]

SSR and AFLP Markers Reveal Low Genetic Diversity in the Biofuel Plant *Jatropha curcas* in China/ Qi-Bao Sun, Lin-Feng Li, Yong Li, Guo-Jiang Wu, Xue-Jun Ge. ***Crop Science***. Madison:Sep/Oct 2008. Vol. 48, Iss. 5, p. 1865-1871 (7 pp.)

Abstract:

Globally, Jatropha curcas L. (Euphorbiaceae) holds much promise for producing biodiesel; it is cultivated in many tropical countries. In the South China Botanical Garden, a germplasm collection of J. curcas has been assembled on the basis of geographic location. However, this collection has not been characterized using molecular techniques associated with germplasm management and utilization. In this study, the genetic relationships of 58 J. curcas accessions were assessed based on simple sequence repeat (SSR) and amplified fragment length polymorphism (AFLP) analyses. Seventeen microsatellite markers were developed using the FIASCO (Fast Isolation by AFLP of Sequences Containing repeats) protocol; only one SSR primer was polymorphic with two alleles. The seven AFLP primer combinations amplified 70 polymorphic loci in total, 14.3% of which were polymorphic. The clustering of genotypes based on the AFLP markers shows that the genetic diversity of J. curcas in Guizhou was notably different from the other samples. [PUBLICATION ABSTRACT]

Inter and intra-population variability of Jatropha curcas (L.) characterized by RAPD and ISSR markers and development of population-specific SCAR markers/ S D Basha, M Sujatha.

Euphytica. Dordrecht:Aug 2007. Vol. 156, Iss. 3, p. 375-386

Abstract:

Jatropha curcas (Euphorbiaceae) is an oil-bearing species with multiple uses and considerable potential as a bioenergy crop. The present investigation has been undertaken to assess the extent of genetic diversity in a representative set of 42 accessions of J. curcas encompassing different crop growing regions in India along with a non-toxic genotype from Mexico as a prelude for utilization of promising and genetically divergent materials in the breeding programmes. Molecular polymorphism was 42.0% with 400 RAPD primers and 33.5% with 100 ISSR primers between accessions indicating modest levels of genetic variation in the Indian germplasm. The within-population variation based on RAPD polymorphism was 64.0% and was on par with the inter-population variation. Polymorphic ISSR markers have been identified that could differentiate the Indian accessions from the Mexican genotype and two of them were converted to SCAR markers. The SCAR primer pair ISPJ1 amplified a 543 bp fragment in all the Indian populations, while ISPJ2 with a specific amplicon of 1,096 bp was specific to the Mexican genotype. Population-specific bands have been identified for the accession from Kerala (2 RAPD markers), Neemuch-1 from Rajasthan (1 each of RAPD and ISSR markers) and the non-toxic genotype from Mexico (17 RAPD and 4 ISSR markers), which serve as diagnostic markers in genotyping. The study indicates an immediate need for widening the genetic base of J. curcas germplasm through introduction of accessions with broader geographical background.[PUBLICATION ABSTRACT]

CROPPING PATTERNS AND SYSTEMS

Current situation and prospects of Jatropha curcas as a multipurpose tree in China
Meng Ye, Caiyan Li, George Francis, Harinder P S Makkar.
Agroforestry Systems. The Hague:Jun 2009. Vol. 76, Iss. 2, p. 487-497
Abstract:

Issue Title: Agroforestry for Commodity Production: Ecological and Social DimensionsThis paper reviews the current status of studies on Jatropha curcas in China. Jatropha curcas has been grown in China for more than 300 years. It is mainly distributed in the southwest from the Yunnan-Guizhou Plateau to the hot and dry Three-River Valley with hot monsoon climate and the southeast in the provinces of Fujian, Guangdong, Guangxi, Hainan and Taiwan along the coast. The regions where it occurs have annual rainfall >500 mm and average annual temperature greater than 19°C. It occurs on a wide range of soil regimes in these regions. In China the jatropha usually blossoms and bears fruits only once a year, but there are also instances of two or more flowerings per year. In some small but high yielding pilot areas, dry fruit output is reported to be 9,000-12,000 kg per ha, whereas in large plantings the output averages only about 1,800 kg per ha. In order to contribute to sustainable production of jatropha, further studies focused on different ecotypes, improvement of seed quality, plantation techniques, flowering and fruiting characteristics, and harvest and post-harvest handling of seeds are required. More research on biomedicinal potential of various parts of the plant and more information on the actual and potential markets is needed to realize the full potential of jatropha. [PUBLICATION ABSTRACT

PLANT PHYSIOLOGY-NUTRITION (2 JDL)

The role of [beta]-ketoacyl-acyl carrier protein synthase III in the condensation steps of fatty acid biosynthesis in sunflower/ Damián González-Mellado, Penny von Wettstein-Knowles, Rafael Garcés, Enrique Martínez-Force.
Planta. Berlin:May 2010. Vol. 231, Iss. 6, p. 1277-89
Abstract:

The ²-ketoacyl-acyl carrier protein synthase III (KAS III; EC 2.3.1.180) is a condensing enzyme catalyzing the initial step of fatty acid biosynthesis using acetyl-CoA as primer. To determine the mechanisms involved in the biosynthesis of fatty acids in sunflower (Helianthus annuus L.) developing seeds, a cDNA coding for HaKAS III (EF514400) was isolated, cloned and sequenced. Its protein sequence is as much as 72% identical to other KAS III-like ones such as those from Perilla frutescens, **Jatropha curcas**, Ricinus communis or Cuphea hookeriana. Phylogenetic study of the HaKAS III homologous proteins infers its origin from cyanobacterial ancestors. A genomic DNA gel blot analysis revealed that HaKAS III is a single copy gene. Expression levels of this gene, examined by Q-PCR, revealed higher levels in developing seeds storing oil than in leaves, stems, roots or seedling cotyledons. Heterologous expression of HaKAS III in Escherichia coli altered their fatty acid content and composition implying an interaction

of HaKAS III with the bacterial FAS complex. Testing purified HaKAS III recombinant protein by adding to a reconstituted E. coli FAS system lacking condensation activity revealed a novel substrate specificity. In contrast to all hitherto characterized plant KAS IIIs, the activities of which are limited to the first cycles of intraplastidial fatty acid biosynthesis yielding C6 chains, HaKAS III participates in at least four cycles resulting in C10 chains.[PUBLICATION ABSTRACT]

Stress-induced curcin-L promoter in leaves of Jatropha curcas L. and characterization in transgenic tobacco/ Xiaobo Qin, Xiaojiang Zheng, Caixia Shao, Jihai Gao, Luding Jiang, Xunlu Zhu, Fang Yan, Lin Tang, Ying Xu, Fang Chen.
Planta. Berlin:Jul 2009. Vol. 230, Iss. 2, p. 387-95
Abstract:

Ribosome-inactivating proteins (RIPs) represent a type of protein that universally inactivates the ribosome thus inhibiting protein biosynthesis. Curcin-L was a type I RIP found in Jatropha curcas L.. Its expression could be activated in leaves by treatments with abscisic acid, salicylic acid, polyethylene glycol, temperature 4, 45°C and ultraviolet light. A 654 bp fragment of a 5' flanking region preceding the curcin-L gene, designated CP2, was cloned from the J. curcas genome and its expression pattern was studied via the expression of the ²-glucuronidase (GUS) gene in transgenic tobacco. Analysis of GUS activities showed that the CP2 was leaf specific, and was able to drive the expression of the reporter gene under stress-induction conditions. Analysis of a series of 5'-deletions of the CP2 suggested that several promoter motifs were necessary to respond to environmental stresses.

PLANT PHYSIOLOGY-REPRODUCTION (1 JDL)

Microsporogenesis and male gametogenesis in Jatropha curcas L. (Euphorbiaceae)1 / Huanfang F Liu, Bruce K Kirchoff, Guojiang J Wu, Jingping P Liao.
Journal of the Torrey Botanical Society. Bronx:Jul-Sep 2007. Vol. 134, Iss. 3, p. 335-343 (9 pp.)
Abstract:

Microsporogenesis and male gametogenesis of Jatropha curcas L. (Euphorbiaceae) was studied in order to provide additional data on this poorly studied family. Male flowers of J. curcas have ten stamens, which each bear four microsporangia. The development of the anther wall is of the dicotyledonous type, and is composed of an epidermis, endothecium, middle layer(s) and glandular tapetum. The cytokinesis following meiosis is simultaneous, producing tetrahedral tetrads. Mature pollen grains are two-celled at anthesis, with a spindle shaped generative cell. A few abnormal microspores were observed following the early stages of microgametophyte development. [PUBLICATION ABSTRACT]

PESTS OF PLANTS (1 JDL)

Cigarrita verde en cultivos de Jatropha curcas en el Estado de Mato Grosso do Sul, Brasil/Green leafhopper in crops of Jatropha curcas in Mato Grosso do Sul State, Brazil/ Harley Nonato De Oliveira, César José Da Silva, Alfredo Raul Abot, Daniele Inocêncio Araújo.

Revista Colombiana de Entomología. Bogota:Jan-Jun 2010. Vol. 36, Iss. 1, p. 52-53 (2 pp.)

Abstract:

The objective of this work was to report the occurrence of Empoasca kraemeri in plantations of physic nut (Jatropha curcas) in Mato Grosso do Sul, in the municipalities of Anastácio, Chapadão do Sul, Dourados, Eldorado, Nova Andradina and Rio Brilhante. Nymphs and adults of this leafhopper were observed on leaves of the plants. In addition to this report, the population dynamics of the leafhopper were evaluated from March 2008 until February 2009, through sticky traps installed in areas
with physic nut plantations from Embrapa Agropecuária Oeste, in Dourados, MS. The greatest populations were observed in February, March, April, May and June, with an absence of insects from August to November. In the periods of greatest occurrence, yellowing and deformity of the leaves was verified. Knowledge of the leafhopper's population peaks will be an important component for defining strategies for its management. [PUBLICATION ABSTRACT]

Effects of plant extracts and oil emulsions on the maize cob borer Mussidia nigrivenella (Lepidoptera: Pyralidae) in laboratory and field experiments/ Komi Agboka, Agbodzavu K Mawufe, Manuele Tamò, Stefan Vidal.

International Journal of Tropical Insect Science. Cambridge:Dec 2009. Vol. 29, Iss. 4, p. 185-194 (10 pp.)

Abstract:

Aqueous extracts of Tephrosia vogelii and Hyptis suaveolens, and of oils of Azadirachta indica and Jatropha curcas, as well as the pesticide Furadan 5G were evaluated for their insecticidal activity against the maize cob borer Mussidia nigrivenella Ragonot in laboratory and field experiments. In general, treated plants had a strong deterrent effect on ovipositing M. nigrivenella. The oviposition deterrence index was highest with neem oil at both concentrations, ***J. curcas*** at 5% and H. suaveolens at 20%. In addition, neem and Jatropha oils adversely affected egg hatch; it decreased with an increase in concentrations of oil emulsions and varied between 3 and 25.5% for neem and 6 and 16% for ***J. curcas***. The lethal concentration 50 values calculated were 1.3 and 0.8%, respectively, for neem and J. curcas. By contrast, larval survival was not affected by the oil treatments. In the field, Furadan, neem and ***J. curcas*** **oils** significantly reduced the number of M. nigrivenella larvae by 16-49.2%, while aqueous extracts of T. vogelii and H. suaveolens were similar to the emulsified water control. The treatments did not significantly influence cob weight, and only neem oil at both concentrations and Furadan significantly reduced cob damage and consequently grain losses. These results showed that oil emulsions of A. indica and **J. curcas oils** act not only as an oviposition deterrent but also as ovicides. The prospects for possible

inclusion of botanicals into integrated M. nigrivenella control in maize cropping systems are discussed. [PUBLICATION ABSTRACT]

PLANT DISEASES (1 JDL)

Metabolic and histopathological alterations of Jatropha mosaic begomovirus-infected Jatropha curcas L. by HR-MAS NMR spectroscopy and magnetic resonance imaging /O P Sidhu, Sanjay Annarao, Uday Pathre, S K Snehi, S K Raj, Raja Roy, Rakesh Tuli, C L Khetrapal.

Planta. Berlin:Jun 2010. Vol. 232, Iss. 1, p. 85-93

Abstract:

Alterations in the anatomical structures, sap translocation and metabolic profiles in Jatropha curcas L. (Euphorbiaceae), infected with Jatropha mosaic virus (JMV) have been investigated using MRI and HR-MAS NMR spectroscopy. The contrast of MRI images distinguishes abnormalities in anatomical structures of infected and healthy stem. The HR-MAS NMR spectroscopic analysis indicated that viral infection significantly affected the plant metabolism. Higher accumulation of TCA cycle intermediates, such as citrate and malate, in JMV-infected plants suggested a higher rate of respiration. The respiration rate was more than twofold as compared to healthy ones. The viral stress also significantly increases the concentrations of alanine, arginine, glutamine, valine, GABA and choline as compared to healthy ones. Microscopic examination revealed severe hyperplasia caused by JMV with a considerable reduction in the size of stem cells. Lower concentration of glucose and sucrose in viral-infected stem tissues indicates decreased translocation of photosynthates from leaves to stem due to hyperplasia caused by JMV. The MR images distinguished stele, cortical and pith regions of JMV-infected and healthy stems. Contrast of T^sub 1^- and T^sub 2^-weighted images showed significant differences in the spatial distribution of water, lipids and macromolecules in virus-infected and healthy stem tissues. The results demonstrated the value of MRI and HR-MAS NMR spectroscopy in studying viral infection and metabolic shift in plants. The present methodology may help in better understanding the metabolic alterations during biotic stress in other plant species of agricultural and commercial importance.[PUBLICATION ABSTRACT]

FOOD PROCESSING (2 JDL)

Biodegradation of *Jatropha curcas* phorbol esters in soil/ Rakshit K Devappa, Harinder PS Makkar, Klaus Becker.

Journal of the Science of Food and Agriculture. London:Sep 2010. Vol. 90, Iss. 12, p. 2090

Abstract:

Jatropha curcas seed cake is generated as a by-product during biodiesel production. Seed cake containing toxic phorbol esters (PEs) is currently used as a

fertiliser and thus it is of eco-toxicological concern. In the present study the fate of PEs in soil was studied. Two approaches for the incorporation of PEs in soil were used. In the first, silica was bound to PEs, and in the second, seedcake was used. At day 0, the concentration of PEs in soil was 2.6 and 0.37 mg g^-1 for approach 1 and 2 respectively. PEs from silica bound PEs were completely degraded after 19, 12, 12days (at 130 g kg^-1 moisture) and after 17, 9, 9 days (at 230 g kg^-1 moisture) at room temperature, 32 °C and 42 °C respectively. Similarly at these temperatures PEs from seed cake were degraded after 21, 17 and 17 days (at 130 g kg^-1 moisture) and after 23, 17, and 15 days (at 230 g kg^-1 moisture). Increase in temperature and moisture increased rate of PEs degradation. Using the snail (Physa fontinalis) bioassay, mortality by PE-amended soil extracts decreased with the decrease in PE concentration in soil. Jatropha PEs are biodegradable. The degraded products are innocuous.

Are Jatropha curcas phorbol esters degraded by rumen microbes?/ Harinder PS Makkar, Klaus Becker.
Journal of the Science of Food and Agriculture. London:Jul 2010. Vol. 90, Iss. 9, p. 1562
Abstract:

Jatropha curcas, a non-edible oil plant, is being promoted as a biofuel plant in a number of countries in tropical and subtropical regions. The kernel meal left after extraction of the oil is a potentially protein-rich feed ingredient. However, the presence of highly toxic phorbol esters limits its use. Degradation of J. curcas phorbol esters by rumen microbes, using an in vitro rumen fermentation system, has been investigated in this study. The difference between phorbol ester contents in the residues obtained with and without substrates at 0, 24, 48 or 72 h of the incubations was statistically similar. Phorbol esters did not affect either the gas or short chain production in the in vitro rumen fermentation system. Rumen microbes can not degrade phorbol esters. In addition, the phorbol esters do not adversely affect rumen fermentation. Ruminants are expected to be as prone as monogastric animals to the toxicity of Jatropha seeds.

FOOD COMPOSITION (2 JDL)

Comparative Evaluation of Physicochemical Properties of *Jatropha* Seed Oil from Malaysia, Indonesia and Thailand A Emil/ Zahira Yaakob, M N Satheesh Kumar, J M Jahim, J Salimon.
JAOCS, Journal of the American Oil Chemists' Society. Champaign:Jun 2010. Vol. 87, Iss. 6, p. 689-695 (7 pp.)
Abstract:

The jatropha oil was extracted from the jatropha seeds collected from different origins viz., Malaysia, Indonesia and Thailand. The physicochemical properties such as density, viscosity, percentage free fatty acid (FFA), iodine value, saponification value and peroxide value of the extracted jatropha seed oil were evaluated. The evaluation of fatty acid composition using gas chromatography (GC) revealed that, oleic (42.4-

48.8%) and linoleic acid (28.8-34.6%) are the dominant fatty acids present in the jatropha seed oil. The saturated fatty acids such as palmitic and stearic acid lie in the range 13.25-14.5 and 7-7.7%, respectively. The observed major triacylglycerol (TAG) composition was OOL (22.94-25.75%) and OLL (15.52-20.77%). [PUBLICATION ABSTRACT]

Protein concentrate from Jatropha curcas screw-pressed seed cake and toxic and antinutritional factors in protein concentrate/ Harinder PS Makkar, George Francis, Klaus Becker.
Journal of the Science of Food and Agriculture. London:Jul 2008. Vol. 88, Iss. 9, p. 1542
Abstract:

Jatropha curcas seeds are highly toxic to livestock. The presence of phorbol esters and antinutrients such as trypsin inhibitor, lectin and phytate and the high level of shells in the seed cake prevent its use in animal diets. Using the principle of isoelectric precipitation, the conditions for preparation of the protein concentrate from oil-containing seed cake and defatted seed cake were optimised and the contents of phorbol esters and antinutrients were determined. The recovery of protein concentrate was highest when the proteins from the seed cakes were solubilised at pH 11 for 1 h at 60 ...C and the precipitation of these proteins was done by lowering the pH to 4. Under these conditions, over 53% of the total proteins present in the seed cakes were recovered in the protein concentrates. The protein contents in the protein concentrates
obtained from the oil-containing seed cake and defatted seed cake were 760 and 820 g kg... respectively. Substantial amounts of phorbol esters were present in the protein concentrates (0.86-1.48 mg g...). Trypsin inhibitor was present at an approximately tenfold higher level in the protein concentrates than in the seed cakes. Lectin and phytate were also present at high levels, but their levels were lower than in the seed cakes. Tannins were present in negligible amounts. To make the protein concentrate from Jatropha seed cake fit for use as an ingredient in livestock feed, phorbol esters must be removed and trypsin inhibitor and lectin inactivated by heat treatment. The adverse effects of phytate could be mitigated by addition of phytase in the diet. (ProQuest: ... denotes formulae/symbols omitted.)

RENEWABLE ENERGY RESOURCES (4 JDL)

Parametric Study of Jatropha Seeds for Biodiesel Production by Reactive Extraction/ Savita Kaul, Jyoti Porwal, M O Garg.
JAOCS, Journal of the American Oil Chemists' Society. Champaign:Aug 2010. Vol. 87, Iss. 8, p. 903-908 (6 pp.)
Abstract:

The purpose of the present study was to reduce the cost and increase the efficiency of biodiesel production by reactive extraction (in situ) of Jatropha seeds. Oil from the seeds was extracted and reacted in a single step. Experimental studies have been carried out to maximize the yield of biodiesel by varying the reaction parameters

viz. seed size (<0.85 mm to >2.46 mm), seed/solvent ratio (w/w) (1:2.6-1:7.8) and catalyst concentration (0.05-0.1 M). Under the optimized conditions: seed size (>2.46 mm), seed/solvent ratio (w/w) (1:7.8), catalyst concentration (0.1 M) and reaction time 1 h, approximately 98% conversion to biodiesel was achieved meeting International (ASTM) as well as National (BIS) specifications. The results were supported by HPLC analysis. [PUBLICATION ABSTRACT]

Mechanical and Abrasive Wear Studies on Biobased Jatropha Oil Cake Incorporated Glass-Epoxy Composites/ M N Satheesh Kumar, Z Yaakob, N Mohan, Siddaramaiah, S P Kumaresh Babu.

JAOCS, Journal of the American Oil Chemists' Society. Champaign:Aug 2010. Vol. 87, Iss. 8, p. 929-936 (8 pp.)

Abstract:

An investigation was made to evaluate the effect of the incorporation of jatropha oil cake (JOC) alone and in combination with silicon carbide (SiC) on the mechanical and tribological wear behaviour of glass fabric-epoxy (GE) composites. A vacuum-assisted resin transfer moulding (VARTM) technique was employed to obtain a series of GE composites containing different fillers viz., silicon carbide, jatropha oil cake and a mixture of SiC and JOC. The effect of different loads (22 and 32 N) and abrading distances from 135 to 540 m on the performance of the wear resistance of the composites were measured. The mechanical properties such as tensile behaviour and hardness of the composites were evaluated. A linear relationship was found between the wear volume loss and the abrading distances. The JOC filled GE composite exhibited a lower specific wear rate by 6 and 10% at 540 m abrading distance for a load of 22 and 32 N, respectively, as compared to that of unfilled GE composites. The worn surface features of unfilled and filled GE composites were examined using scanning electron microscopy (SEM). [PUBLICATION ABSTRACT]

Quality of Biodiesel Prepared from Phorbol Ester Extracted *Jatropha curcas* Oil/ Rakshit Kodekalra Devappa, Jeroen Maes, Harinder Paul Singh Makkar, Wim De Greyt, Klaus Becker.

JAOCS, Journal of the American Oil Chemists' Society. Champaign:Jun 2010. Vol. 87, Iss. 6, p. 697-704 (8 pp.)

Abstract:

Jatropha curcas seeds are rich in oil (28-32%), which can be converted to high quality biodiesel. The oil is non-edible due to the presence of toxic compounds, namely, phorbol esters (PEs). PEs have a number of agricultural/medicinal/pharmaceutical applications and hence their recovery generatesa value added co-product towards the biodiesel production chain. This study aims to assess the effects of PE extraction on quality of both the residual oil and the biodiesel production from it. Two Approaches (1, use of an Ultra-turrax; and 2, use of a magnetic stirrer) were used with an effective treatment time of 2 and 5 min, resulting in 80 and 78% extraction of PEs, respectively. The phosphorus content was reduced by 70.2 and 75.8%, free fatty acids by 55.3 and 55.6%, and the fatty acid composition did not change in the residual oils. The peroxide value increased from 2.69 (untreated oil) to 3.01 and 3.49 mequiv O2/kg in the residual

oils following Approach 1 and Approach 2, respectively. The biodiesel prepared from both residual oils met European (EN 14214:2008) and American biodiesel standard (ASTM D6751-09) specifications. Oxidative stability indices for both the biodiesels were well within the permitted limit. It is concluded that PEs could be isolated in active forms for various applications by either of the two methods with a high yield and the residual oil can be processed to produce high quality biodiesel. [PUBLICATION ABSTRACT]

Potential of *Jatropha curcas* as a source of renewable oil and animal feed/ Andrew J. King, Wei He, Jesús A. Cuevas, Mark Freudenberger, Danièle Ramiaramanana, Ian A. Graham.
Journal of Experimental Botany.: Special Issue: Crop Science for a Changing Climate, Plant Oxford:Jul 2009. Vol. 60, Iss. 10, p. 2897-2905 (9 pp.)
Abstract:

Jatropha curcas (L.) is a perennial plant of the spurge family (Euphorbiaceae). Recently, it has received much attention as a potential source of vegetable oil as a replacement for petroleum, and, in particular, the production of biodiesel. Despite the interest that is being shown in the large-scale cultivation of J. curcas, genetic resources remain poorly characterized and conserved and there has been very little plant breeding for improved traits. At present, the varieties being used to establish plantations in Africa and Asia are inedible. The meal obtained after the extraction of oil cannot, therefore, be used as a source of animal feed. Naturally existing edible varieties are, however, known to occur in Mexico. The toxic components of J. curcas seeds, the potential for plant breeding to generate improved varieties, and the suitability of J. curcas oil as a feedstock for biodiesel production are discussed.

Do UK biofuels have a future?/ Richard Crowhurst.
Crops. Sutton:May 10, 2008. p. 26 (1 pp.)
Abstract:

D1 Oils' core business is in the development of Jatropha curcas, a marginal, poisonous oilseed-bearing plant with the potential to become a plantation crop for use as a biodiesel feedstock. In the absence of commercially available jatropha oil from D1 Oil's own plantations, the company had been using vegetable oil feedstocks bought on the open market. Two factors conspired to make this uneconomic - rising commodity prices and the flow of subsidised biodiesel from the USA into Europe.

Green Gold in a Shrub/ Rebecca Renner.
Scientific American. New York:Jun 2007. Vol. 296, Iss. 6, p. 20-23
Abstract:

For hundreds of years, Africans in places such as Tanzania and Mali have used Jatropha curcas (jatropha) as a living fence. Now biodiesel entrepreneurs in tropical zones in Africa and India are buying up land, starting plantations and looking forward to making fuel from the seeds, which, they argue, will be better for the global environment and economy than conventional biofuel crops grown in temperate climates.