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## Performance Evaluation of a Sugarcane Peeling Machine

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### Abstract

Machinery removal of sugarcane leaves reduces harvest costs, time, and effort. Therefore, designing and manufacturing a sugarcane peeling machine using locally available raw materials is of imminent importance. Three sets of drums were designed: the first is used for in-take and cleaning of stalks, the second is used to help scroll and clean stalks, and the third is used for further cleaning and discharge of stalks. The manufacture of the machine relied on metal and rubber, and used a diesel engine with a capacity of 24.5 hp and a speed of 2150 rpm. The idea was based on the principle of friction and pressure. Experimental tests were applied to study the efficiency of the machine and its effect on the crop during peeling, during which several parameters were applied. Tests were applied to (G.T.54/C9, also known as C9) sugarcane variety, which is the only commercially cultivated variety in Egypt. Parameters focused on stalk damage rate as well as on discharge distance. They were applied to both intact straight stalks, which were properly cultivated and served, and logging stalks, on three weaning periods: 10 days, 20 days, and 30 days; and at three velocities: 500 rpm, 600 rpm, and 700 rpm. The performance and efficiency of the machine through the parameters of speed (rpm), discharge distance (m), stalk damage rate (%), quantity of production (t/h), and consumption of fuel (l/h), with the age of weaning being set to 30 days, were measured. Parameters applied at a 700-rpm velocity, showed the best results in the case of straight stalks, on various parameters including discharge distance (1.55 m), stalk damage rate (0.5%), quantity of production (5.040 t/h), and consumption of fuel (1.55 l/h) at a 30-day weaning period. Parameters applied at a 600-rpm velocity, showed the best results in the case of logging stalks, on various

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parameters including discharge distance (0.35 m), stalk damage rate (25.34%), quantity of production (3.960 t/h), and consumption of fuel (1.45 l/h) at a 30-day weaning period.

**Keywords:** *Sugarcane, Peeling machine, Leaf remover, Sugarcane leaf stripper, Sugarcane mechanization.*

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## **Isolation and Purification of Sugarcane Waxes from Sugarcane Peels and Filter Cake Mud**

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### **Abstract**

Sugarcane bagasse was collected from different sources (from local juice centre, Egyptian Sugar & Integrated Industries Company, The residue of the sugar production and by scratching of sugarcane). The waxes were extracted using different solvents (water, ethanol, n-hexane, toluene and methylene chloride). The waxes obtained from each solvent containing different components. The extracted waxes were crystallized and then carrying out different analyses for each fraction of them (FT-IR, H NMR and GC-MS spectra), depending on the analyses we determined the wax components.

**Keywords:** *Sugarcane bagasse, Filter cake mud, Waxes, Scratching, Isolation.*

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## Volatile Constituents of *Beta Vulgaris* pulp-wastes as a Source of Bioactive Natural Products

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### Abstract

The recycling of agro-industrial bio-wastes of most vegetable residues into value-added products has been highly encouraged. High-value naturally occurring compounds can be found in sugar beet pulps. Comprehensive GC/MS analysis of the volatile compounds of petroleum ether (60-80°C) and methylene chloride fractions of sugar beet pulps has led to the identification of thirty eight volatile secondary metabolites of biological interests belonging to different classes such as acetogenins (Fat derivatives), sesquiterpenes, sterols and shikimate derivatives (phenolic constituents). Twenty-two compounds were identified from petroleum ether (60-80°C) extract, the most predominant constituents were n-hexadecanoic acid (42.79 %), (Z,Z)-9,12-octadecadienoic acid (21.94%), hexadecanoic acid, methyl ester (6.67%), (E)-8-octadecenoic acid methyl ester (5.40%), (Z, Z)- 9,12-octadecadienoic acid methyl ester (5.02%) and (3β, 5α)-stigmasta-7,16-dien-3-ol (1.53%). Methylene chloride fraction afforded twenty three compounds and the more predominant constituents were 2-hydroxy-1-(hydroxymethyl) hexadecanoic acid ethyl ester (11.20 %), (Z) 9- octadecenal (7.08%), hexadecanoic acid, methyl ester (5.17%), 4-((1E)-3-hydroxy-1-propenyl)-2-methoxyphenol (4.37%), n-hexadecanoic acid (3.23 %), (Z,Z)-9,12-octadecadienoic acid methyl ester (3.04 %), (Z)-9-octadecenoic acid methyl ester (2.95%) and (3β, 24S) stigmast-5-en-3-ol (2.00 %).

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*Keywords: Volatile phytochemical constituents, Beta vulgaris, Sugar beet pulps, GC/MS techniques.*

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## **Hydrochemical Classification of Groundwater in West Assiut Combined Cycle Power's Area, Assiut, Egypt**

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### **-----Abstract**

Groundwater is the main source for water used in West Assiut Electric Power Plant (WACCPP), so here we will study the hydrochemical class and water type for WACCPP area's groundwater, with respect to the physiochemical, chemical elements and chemically related properties. Hydrochemical formulae's as Kurolov formula, hypothetical salts, hydrochemical indices and water type identification programs as Piper, Durov, Schoeller, Gibb, and Chadha will be applied for deciding the water class and type.

***Keywords: Groundwater, WACCPP, hydrochemical parameters, Hypothetical salts, Hydrochemical indicators, Hydrochemical faces.***

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## **Tartaric Acid Grafted Sugarcane Bagasse for Removal of Chromium(VI) from Aqueous Solutions**

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### **Abstract**

Hexavalent chromium is a priority toxic and carcinogenic chemical when present in excess. It is very much required to remove it from effluents before allowing it to enter any water system or on to land. In the present study, the removal of Cr(VI) by adsorption from wastewater using low cost adsorbent modified sugarcane bagasse by tartaric acid (SCB) was studied. The effect of the initial concentration of Cr(VI), bio sorbent dosage, temperature, contact time, and pH were studied. It was noted that the removal decreased with the increase in the initial concentration of Cr(VI) ions and also pH. The adsorption of Cr(VI) from water was favorable at low pH values. The kinetic of the Cr(VI) adsorption on SCB was found to follow pseudo - second order mechanism. The adsorption data can be satisfactorily explained by Freundlich isotherm. This work proved that treated bagasse can be used as an efficient adsorbent material for removal of Cr(VI) from wastewater.

**Keywords:** *Adsorption; Sugarcane bagasse; Hexavalent chromium; Tartaric acid.*

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## **Treatment of Raw Cane Juice with Organo Bentonite and Ultrafiltration Membranes for White Sugar Production**

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### **Abstract**

Polysulfone (PS) ultrafiltration (UF)-membrane with Molecular Weight Cut Off (MWCO) 100kD was examined with the aim of improving the sugarcane juice clarity while a modified bentonite (organo-bentonite) by benzalkonium chloride (BAC) was used as adsorbent for reducing colour and turbidity instead of sulphitation process. Factors influencing the adsorption capacity of organo-bentonite, such as BAC concentration, adsorbent dosage, pH, contact time and temperature beside factors that influence the ultra-filtration process like transmembrane pressure and temperature were systematically investigated and discussed. The results of analysis indicated that the adsorption capacity of organo-bentonite increases with increasing BAC concentration, adsorbent dosage, temperature and with decreasing pH while membrane flux increases with increasing transmembrane pressure and temperature. The optimum conditions were adjusted at a constant reaction time (10 min), temperature 75 °C, pH 5.0, BAC concentration of amount equal to 100% of cation exchange capacity (CEC) of bentonite and organo-bentonite dose (0.6 g/L) which were determined on minimization of colour, turbidity, ash content and invert sugar and maximization of purity. At this optimum point: colour, turbidity, ash%, reducing sugars% sugar and purity were found to be 7635 IU<sub>420</sub>, 3.0 NTU, 0.474%, 4.8% and 85%, respectively. Also the clarified juice quality obtained by the treatment was improved greatly when compared with conventional limed-sulphated juice as the

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colour and turbidity in the clarified juice were removed by the rate of 32% and 94%, respectively.

**Keywords:** Raw cane juice, Organo-bentonite, Ultra-filtration, Membranes.

(7)

## **Improving the Efficiency of Extraction of Sugar Cane Mills Using Rollers with Compound Triple Pitch**

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### **Abstract**

Sugar cane mills are the equipment used in extracting sugar solution from sugar cane plant. The effect of the roller pitch has been studied as one of the constituent parts of the mills by modifying the universal pitch to the triple pitch compound and experimenting with extracting different sugar cane weights ( total nine samples ) . On both mills , universal and triple compound pitch on the mills rollers under the same conditions and control of the correct setting taking into account with the uniformity of samples and it was recorded the results were positive by increasing the weight of the squeezed sugar cane in the three - pitch compound rollers mills of extracted juice which increasing percentage up to 3.02 % in contrast to the extraction of single pitch rollers mills which was positive only on low weights.

***Keywords:*** Sugar Cane Mills; Rollers; Extraction Efficiency; Compound Triple Pitch.

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## **Effect of Soil Amendments Application on Juice Quality and Sugar Yields of Sugar Beet Grown under Saline Soil Conditions**

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### **Abstract**

Soil salinity adversely affects quality parameters of sugar beet juice leading to a reduction in recoverable sugar yield. Improving the physical and chemical properties of salt affected soils is essential for sustainable cultivation and production of sugar beet in Egypt. A field experiment was carried out at the Delta Sugar Company to evaluate soil amendments, i.e., Phosphogypsum (PG), Desaline, humic acid and treated filter cake and molasses application on roots quality and sugar yield of sugar beet. Application of molasses at a rate of 50 L/fed. significantly increased sugar content (Pol%) only in the first growing season, while soil amendments do not have any significant in sugar content increment and the highest sugar content was produced from plants in the control treatment. Application of soil amendments in particular 1 ton/fed. of treated filter cake significantly reduced Na%, K% and  $\alpha$ -amino-N in root juice in both growing seasons. Soil amendments application significantly increased sugar beet juice quality, theoretical sugar yield (TSY) and recoverable sugar yield (RSY) in both growing seasons. The highest value of quality index was produced from the application of 1 ton/fed. of treated filter cake. The application of either treated filter cake or 50 L/fed. of molasses

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significantly enhances both theoretical and recoverable sugar yields. The effect of soil amendments and molasses application on sugar loss yield was barely significant, and varietal and environmental dependent.

***Keywords: Sugar beet; Salinity; Juice quality; Sugar yield; Sugar loss.***

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