



contents

Title	page
Egyptian Sugar Recovery Formula for Sugar Beet. <i>Samir Y. El-Sanat</i>	1- 25
Key Factors Affecting the Efficiency of Ethanol Fermentation Using Beet Molasses. <i>A. A. Zohri</i>	27- 44
Filamentous Fungi and their Enzymatic Activities Associated with Sugar Cane Molasses. <i>M. A. Abdel-Sater</i>.....	45 - 60
Preparation of Hydrogels by Grafting of Lignin with Polyvinyl Alcohol and Polyacrylamide . <i>Waleed K. El-Zawawy</i>.....	61-73
A New Technique for Planting Sugarcane in Egypt. <i>Mohamed Owais</i>.....	75 -85
Performance of Commercial Sugarcane Loading Equipment Available in Upper Egypt <i>Hassan A. Abdel-Mawla</i>.....	87- 107
Maximizing Productivity and Water Used Efficiency of Sugarcane Crop. <i>Mohamed B.D.</i>	109- 130
Assessment of somaclonal variation, correlation and stepwise regression to evaluate new sugarcane somaclones. <i>Abo-Elwafa A.</i>	131- 150

Egyptian Sugar Recovery Formula for Sugar Beet

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Abstract

An Egyptian formula was previously developed to calculate the predicted sugar beet losses in molasses for the Egyptian sugar beet. Determination of the amount of sugar in sugar beet is usually accomplished by the polarimetric method in sugar industry. This method is not accurate due to the existence of impurities such as sodium, potassium and amino nitrogen that might cause some error in the evaluation of the technical quality of sugar beet. In this research, 170000 samples of sugar beet from different regions were analyzed by the Betalyzer for two consecutive years (2013- 2014). Comparison between the experimental results and the estimated one based on the Reinefeld model showed that this model couldn't successfully estimate the amount of sugar loss in molasses under the for Egyptian conditions. Therefore a new model based on the obtained results has been developed and was suggested for this type of climatic condition.

Keywords: Reinefeld Model, Semi-Arid Area, Sugar Beet Impurities, Sugar Loss in Molasses Technical Quality.

Key Factors Affecting the Efficiency of Ethanol Fermentation Using Beet Molasses

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Abstract

A number of factors affecting yeast fermentation performance have been investigated. These include temperature, pH and substrate concentration. Temperature, pH (physical factors) and substrate (sugar) concentration were observed to play a key role in productivity and fermentation efficiency of ethanol fermentation of beet molasses. The optima production conditions for bio-ethanol from beet molasses by the tested yeast strain were: 20% sugar concentration, pH at 5.0 for normal & high gravities and incubation temperature at 32°C for normal gravity and 35°C for high gravity conditions.

Keywords: bio-ethanol, fermentation efficiency, productivity, beet molasses, yeast, normal gravity and high gravity.

Filamentous Fungi and their Enzymatic Activities Associated with Sugar Cane Molasses

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Abstract

Cane molasses is a by-product of sugar production from the sugar cane. It contains about 50% saccharides in addition to considerable levels of proteins, minerals and vitamins. These constituents may favor the presence of fungi in molasses. Twenty-five samples of Egyptian cane molasses were collected from different five sugar factories (5 for each) in Egypt named Abo Qurqas, Nag Hammady, Dishna, Qus and Kom Ombo. Samples were mycological analyzed using cellulose and 25% Sucrose Czapek's agar media. On cellulose Czapek's agar medium, eight species in addition to one species variety belong to 5 genera of fungi were recorded from only 18 out of the 25 tested samples. On 25% Sucrose Czapek's agar medium, 11 identified plus one unidentified species belong to 8 fungal genera were isolated from 18 of the 25 tested samples. The most common species on both media were *Aspergillus flavus* and *A. niger*. A total of 28 isolates of filamentous fungi belong to 13 species plus one variety of 9 genera were collected in this study and screened for their ability to produce both of cellulase and invertase. All tested isolates showed positive results with variable secretion levels for both cellulase and invertase.

Keywords: *Molasses, Filamentous fungi, Osmophilic fungi, Cellulose decomposing fungi, Invertase and Cellulase.*

Preparation of Hydrogels by Grafting of Lignin with Polyvinyl Alcohol and Polyacrylamide

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Abstract

Grafting of lignin, which is a by product resulting from pulping process, is extremely interesting study. In this work, lignin precipitation was performed by acidification of black liquor with 10 % (by weight) sulfuric acid and used as hydrogel by grafting it with polyvinyl alcohol and polyacrylamide. Moisture content, ash content, bulk density and external acidity/alkalinity of precipitated lignin were determined. The precipitated lignin and the synthesized hydrogels were characterized by infrared spectroscopy, thermogravimetric analysis, and X-ray diffraction.

Keywords: lignin graft copolymerization, hydrogel, moisture content, thermogravimetric analysis, X-ray diffraction.

A New Technique for Planting Sugarcane in Egypt.

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Abstract

Egyptian Farmers traditionally propagate sugarcane using stalk cuttings containing 3 to 4 buds. It takes 5– 6 tons of seed cane /fed (1 fed= 4200 m²) is consumed for planting. This work was carried out at El-Mattana research station, Luxor Governorate, Egypt to examine replacing cane cuttings with bud chips for crop establishment. The dominant cultivar G.T.54-9 was used in this study. Bud chipping machine was used to prepare bud chips that was planted in trays filled with peat moss and vermiculite mixture, or planted in mini plots near the permanent planting field. Direct set planting (conventional method) was carried out using three budded cane sets planted directly in the main field at the same date of nursery preparation.

The study indicated that planting sugarcane using seedlings from bud chips saved about 97% by weight of stalk material. Bud chips planted in trays along with chips planted in mini-plots were statistically higher than conventional method on sprouting and germination percentage.

Seedlings arising on tray recorded higher field survival of 95% as compared to those arising on mini plot (82.5%) under field conditions.

The study showed that bud chip is a viable and economical planting technique for reducing total sugarcane production costs.

KEY WORDS: sugarcane; transplanting; sugarcane nursery; planting dates; planting methods.

Available in Upper Egypt

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Abstract

The current research article study the performance of the commercially sugarcane loaders available in the sugarcane production area in Upper Egypt. The sugarcane loaders that are owned and operated for sugarcane loading are the tri-wheel self propelled loader, the four wheel self propelled loader and the articulated tractor front mounted loader. The tri-wheel loader is hydraulically driven and of high maneuverability. The four wheel self propelled loader is mechanically driven that has equal maneuverability as the tractor mounted loader. The study devoted to evaluate the performance of each loader and to determine the capabilities of each machine when operated at the prevailing conditions of sugarcane delivery system. Self propelled loaders are expensive machines supposed to be operated at higher loading rate to maintain economical performance especially, such machines are seasonally operated during the sugarcane delivery season and have no chance to be operated after the season end. The tractor mounted loader is easy attached and detached on the tractor where the tractor become free to be operated for the regular farm duty after the sugarcane delivery season end. The high capabilities of the self propelled loaders especially the tri-wheel loader is largely determined when the loader operated in a transloading site located on asphalt road. The operator has to be careful while maneuvering and the loader has to wait for the road to be free from traffic. Also the excellent maneuvering capabilities of the tri-wheel loader as a hydraulically driven

machine may not represent an advantage when the machine operated for infield loading. This mainly because of the machine has to move slowly when maneuvering cross furrows to maintain loader stability. The tractor mounted loader proved high stability when operated for infield loading because the tractor is designed to move inside the field.

The results show that the tri-wheel-loader is expensive machine has excellent maneuverability and short loading cycle time if and only if no other limitations exist in the yard. The tractor front mounted loader shows higher stability and traction capabilities when operated inside the field.

Maximizing Productivity and Water used Efficiency of Sugarcane Crop**Mohamed, B.D.*, A.B.A. El- Taib** and A. M. Attia*****

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Abstract

The presented study was carried out at Kom-Ombo Agricultural Research Station farm during 2013/2014 and 2014/2015 seasons to determine the role of irrigation systems, seed quality and potassium (k) fertilizer levels in maximizing productivity and water used efficiency of sugarcane crop. The G.T. 54-9 variety (commercial variety) was used. The irrigation systems were alternate and traditional surface systems. Treated with hot water and untreated seeds were the seed quality. The K fertilizer levels were 0.0, 24.0, 48 and 72 kg/fed. The experiment design was randomized complete blocks with three replication arranged in split-split plots system. Plot area was 80 m².

The results indicated that irrigation of sugarcane crop by alternate system, planting with treated seed and applying 48 kg K fertilizer gave the highest cane and sugar yields in both plant cane and first ratoon crops across the two successive seasons. Otherwise, irrigating of sugarcane crop by traditional surface system, planting with untreated seed without applying K fertilizer recorded the lowest cane and sugar yields in both seasons. Using alternate irrigation system save 5056.13 m³ and 5475.46 m³ in plant cane and first ratoon crops, respectively and greatly improved water used efficiency.

Assessment of Somaclonal Variation, Correlation and Stepwise Regression to Evaluate new Sugarcane Somaclones

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Abstract

Significant differences could be found among the somaclones each other and their donor GT-54 9 for all studied traits in plant cane as well as first and second ratoon crops. Moreover, the highest values of genotypic (GCV) and phenotypic variations (PCV) were correlated with reducing sugar in all three successive seasons recording 20.55 and 22.67, 8.27 and 8.93, and 10.53 and 10.73% in plant cane, first and second ratoon crops, respectively. The obtained significant differences coupled with GCV, PCV and heritability estimates explained the differences among the studied genotypes regenerated from the immature leaves of GT- 54 9 variety of sugarcane which named somaclonal variation. The somaclone no. 6 surpassed significantly the donor GT 54-9 for purity % and sugar yield in plant cane and first ratoon crops and insignificant in second ratoon crops. High and positive estimates of correlation coefficients were recorded between sugar yield and each of sugar % in gram, sweetness % and purity % in plant cane and both first and second ratoon crops, which accounted 0.851, 0.843 and 0.861 in plant cane, 0.861, 0.911 and 0.624 in first and 0.973, 0.987 and 0.903 in second ratoon crops, respectively. Moreover, sugar yield correlated in high positive values with brix volumetric in first (0.682) and second (0.951) ratoon crops, as well as with brix weighted (0.935) in second ratoon crop. Also, the weight of millable stalk/plot possessed high and positive estimates of correlation with number of millable stalk/plot across the three respective crops (0.604 ~ 0.900). It is remark result that the traits of brix volumetric, brix weighted,

sugar% in gram, sweetness %, purity % and sugar yield were correlated each other in high and positive estimates in range of 0.795 to 0.996 in second ratoon crop. It is clear result revealed from stepwise regression that the first model includes only sweetness % (as in the first ratoon), but with high R² of 0.972. Moreover, the fitted model no. 2 includes sweetness % and purity % with R² equal to unity (=1). Consequently, this model is superior one and could be used to determine those two traits for selection to high sugar yield in sugarcane. The expected sugar yields for all fitted stepwise models were insignificant different relative to the actual sugar yield in the three successive crops as revealed by t-test which tend to be zero in some models. Moreover, the correlation coefficients between expected and actual sugar yield were positive, very high and reached to the unity in second ratoon crop. These results displayed the effectiveness of stepwise regression analysis to determine the strongest trait/s to in contribution to high sugar yield even from cane and quality components in sugarcane.

Key words: sugarcane, Immature leaves, callus, somaclones, somaclonal variation, correlation, stepwise regression.

