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# 1- In Field Assessment of Somaclonal Variation among Sugarcane Clones Derived through Immature Leaf Callus Cultures

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## Abstract

The analysis of variance revealed that highly significant mean squares were found among clones derived from the origin GI-54 9 variety for weight and number of millable stalk / plot, weight of single stalk and brix value in the three respective seasons (plant, first and second ratoon crops, respectively) reflecting the genetic differences among obtained clones and also comparing to the origin one.

It is observed that the weight of stalk / plot was increased in remarkable values in second ratoon crop compared to plant and first ratoon crops for all clones as well as the donor. Also, the first ratoon crop gave higher values than plant crops in 58 out of 73 clones (79.45%) for weight of stalk / plot.

Estimated average of weight of stalk/plot recorded 201.27, 260.68 and 841.05; 151.06, 265.28 and 729.33; 269.33, 241.67 and 677.08; 266.13, 235.94 and 494.13; and 159.0, 247.0 and 501.8 for G1; G2; G3; G4 and G5 compared to 174, 211 and 567.8, kg for the origin GT-54 9 variety in plant crop, first and second crops, respectively. Moreover, the average of G1, G2 and G3 in second ratoon crop as well as G1, G3 and G4 in plant crop significantly surpassed the origin.

According to the direct response (DR %), the clones were divided into five distinct groups named G1, G2, G3, G4 and G5. The DR averages were +14.66 and +40.85, -13.19 and +28.42, +54.79 and 19.25, +29.96 and -12.98, -8.62 and -11.62 % for G1 (22 clones), G2 (18 clones), G3 (12 clones), G4 ( 16 clones) and G5 (5 clones) in plant crop (PC) and second ratoon (SR), respectively.

Thirty clones significantly surpassed the origin GT-54 9 variety by more than 28% for weight of millable stalk/plot in second ratoon (RS). These clones were in total of 18, 7 and 5 belong to G1, G2 and G3 and yielded in an average of 890.22 (DR = 56.79 5%), 890.29 (DR = 56.97%) and 730.8 (DR = 28.61%), respectively.

Moreover, 19, 31 and 41 clones were significantly surpassed the origin GT-54 9 variety in plant crop, first and second ratoon crops for number of millable stalk/plot, respectively. Moreover, the clones of G1 possessed the highest average value of 435.73 compared to the others which gave 424.17, 368.58, 299.75, 333.2 and 349.2 for G2, G3, G4, G5 and donor GT-54 9 variety for number of stalk/plot in second ratoon, respectively.

Large variability in weight of single stalk was obtained among derived clones. The G1 clones expressed the highest values of 1.33, 1.89 and 1.93, kg and significantly exceeded the others groups and also the origin GT-54 9.

Two clones no. 67 (belong to G1) and no. 59 (belong to G3) exhibited brix values of 22.80 and 22.67, respectively, significantly exceeded the origin GT-54 9 which gave 19.97 in second ratoon crop. Also, clone no. 59 presented brix value of 20.0 in plant crop significantly exceeded the origin (17.50).

High coefficients of variation among somaclones of distinct groups were found for weight of stalk/plot (8.5 -24.83), number of stalk/plot (7.84 - 21.84), weight of single stalk (9.33 - 25.17) and brix value (4.34 - 15.04%).

The estimates of heritability were very high (> 70%) for weight and number of stalk/plot, weight of single stalk and brix value.

Significant and high positive correlation coefficients were found between weight and number of stalk / plot in plant crop, first and second ratoon crops and recorded values varied from 0.503\* to 0.883\*\* for all clones, G1, G2, G3 and G4, except in plant crop of G1 and G3. It is clear that the correlation coefficients were increased between weight and number of stalk/plot from plant crop to second ratoon in previous groups. Negative and significant or not significant correlations were found between number of stalk /plot and weight of single stalk for all clones and groups, reflecting the large number of stalk possessed less weight of single stalk in the same clones.

**Key words:** Somaclon, subclone, tissue culture, callus, immature, ratoon, millable.

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## 2- Study Of the Effects of Furnace cleaning on the performance and emissions from assuit power plant

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Thermal electric power plants is usually considered as one of the largest stationary emission sources, where; combustion of heavy fuel oils that contains high sulfur, sodium, potassium and vanadium contents in its furnaces is known to produce a host of corrosion and environmental problems, the slag produced during combustion has a low melting temperature and adheres to the hot metal surfaces (450 °C and above). Vanadium salts are extremely corrosive, since they attack the metal surface and dissolve the protective oxide film on the metal surface and then transport oxygen to the clean, pure metal surface that corrodes; these sticky deposited materials capture ash and soot, which reduce the heat transfer leading to decrease in the boiler efficiency, increase in fuel consumption and consequently high emissions [1]. Severe corrosion in hot and cold zones of the furnace and emissions of obnoxious gases, particulates and acid to the atmosphere are a few of a lot which will cost millions by way of chronic corrosion problems causing unscheduled forced shut downs and unscheduled maintenance, and frequent replacement of equipment and parts resulting in high maintenance costs and loss of production besides creating a threat environmental problems [1,2]. In the way for reduction of the scale formation and vanadic corrosion in the fireside in thermal power station utilities, different techniques are used, the more widely accepted technique is the formation of higher melting



compounds in the slag via fuel additives, which results in the production of dry, non-adhering and therefore non-corroding slag [1,3]. Fuel oil has long hydrocarbon molecules which requires a longer time to burn completely so fuel oil combustion will produce too much soot in the furnace. Chemical additives act as a catalyst and scientists say that additives lower the ignition point on soot with 200 - 400°C. And thus by re-burning the soot instead of producing soot in a boiler, the boiler walls get cleaner and heat

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### **3- Production of exo-polygalacturonase enzyme by fungal strains isolated from citrus fruits**

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#### **Abstract:**

The biotechnological potential of pectinolytic fungi isolated from citrus fruits was studied. Seventy five fungal isolates were isolated from decayed citrus fruits. All of these isolates were screened for their pectinolytic activity. Thirty six out of seventy five isolates proved to have pectinolytic activity. These isolates were identified and classified into twenty strains belonging to eleven species appertaining to six genera of fungi. *Aspergillus* was the first predominant genus encountering in 50% of the total isolates. The second higher incidence rate was recorded for the genera of *Cladosporium* and *Penicillium*.

Evaluation of the twenty strains for their ability to produce the exo-polygalacturonase enzyme indicated that, *A. niger* AUMC 4156 and *P. oxalicum* AUMC 4153 were the highest producers of this enzyme and their potentiality were superior to that of the imported strain *A. niger* NRRL 337, known as the highly enzyme producer. Studying the environmental and nutritional factors leading to maximum exo-polygalacturonase production by these three strains showed that, the optimum incubation temperature was 40°C in case of *P. oxalicum* AUMC 4153 and 30°C in case of *A. niger* AUMC 4156 and *A. niger* NRRL 337. The optimum pH values were 5, 6 and 7 for *A. niger* AUMC 4156, *A. niger* NRRL 337 and *P. oxalicum* AUMC 4153, respectively. The optimal incubation period was five days and the best inoculum size was 2% for all the studied fungal strains. Pectin at concentration of 4% proved to be the best carbon source for all fungal strains, followed by starch in case of *Aspergillus* and by sucrose in case of *Penicillium*. Also, it was found that, the maximum enzyme production was attained by using of 4% yeast extract as the sole nitrogen source for all the studied fungi.

#### **Keywords:**

Pectinolytic activity – exo-polygalacturonase – citrus fruits – fungi.

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#### **4- Some nutritional and environmental factors affecting progesterone transformation by using *Humicola hyalothermophila* IMI 204250**

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##### **ABSTRACT:**

The transformation of progesterone with the experimental organism was found to be greatly affected by different nutritional and environmental factors tested. The higher rate of progesterone conversion and better transformation yields were obtained in presence of 50-60 g/L of glucose as carbon source and 2 g/L of sodium nitrate as nitrogen source when fermentation medium adjusted to around neutrality (at pH range from 6.5 to 7.5). The higher yields of 11 $\alpha$ -hydroxyprogesterone and cortisol was recorded at 35°C while 11 $\alpha$ -isomers (11 $\alpha$ -hydroxyprogesterone and epicortisol) was accumulated at 45°C.

The optimal progesterone bioconversion to trihydroxylated products (cortisol and epicortisol) was obtained by using 1.5 g K<sub>2</sub>HPO<sub>4</sub>, 2 g MgSO<sub>4</sub>·7H<sub>2</sub>O, 0.3 g CaCl<sub>2</sub>, 0.2 g CdCl<sub>2</sub> and 0.3 g ZnSO<sub>4</sub> in one liter of fermentation medium. 17 $\alpha$ , 21-dihydroxyprogesterone was detected with the addition to the other derivatives of progesterone when Fe or Mn ions supplemented to the basal medium. Presence of Cu or Co ions (0.05-0.5 g/L) in the basal medium proved to be inhibitor for both mycelial growth and progesterone bioconversion. Generally, the various transformation products were found to be affected quantitatively as well as qualitatively by the nature of fermentation medium.

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#### **5- Expert System Assisting Farmer Choice of Blockage Overcome in Stripping Column by Applying a New Scale-Inhibitor Mixture in Hawamdia Distillery-SIIC-Giza-Egypt**

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##### **Abstract**

A new scale inhibitor was applied where a series of runs were conducted on clarified molasses of mash containing 1723 mg/dl CaSO<sub>4</sub>. The suitable concentrations of the antiscalant components were in the range from 5 to 30 ppm of different phosphonates, acrylic polymer and its co-polymer. The new antiscalant

mixture as well as the commercially available inhibitors were tested at the same conditions of laboratory and pilot scales.

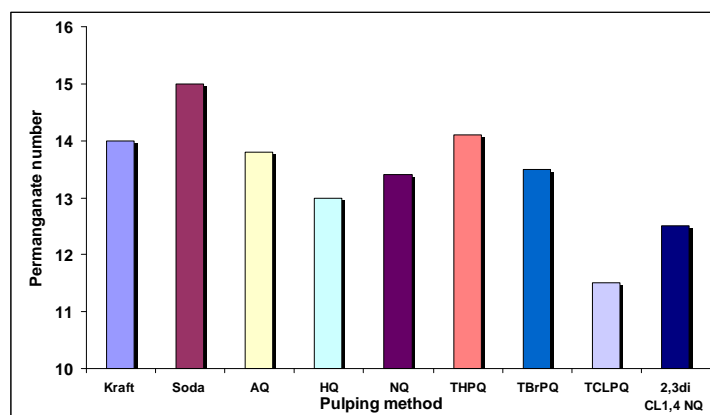
The proper antiscaling mixture was chosen according to its maximum effective inhibition of CaSO<sub>4</sub> precipitation and the greatest distortion of CaSO<sub>4</sub> crystals at a dose of 20 ppm of this mixture. Applying this inhibitor enables us to enlarge the time intervals for mechanical cleaning of the stripping column, which can be regarded as an important advance in alcoholic distillation technology.

## 6- Development Kraft pulping of bagasse by using soda-quinones derivatives

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### Abstract

Bagasse was pulped by soda and soda-quinones derivatives liquor with various cooking parameters. Seven additives to the soda pulping process as anthraquinone, hydroquinone, naphthoquinone, tetrahydroxy-p-benzoquinone, tetrabromo-p-benzoquinone, tetrachloro-p-benzoquinone and 2,3-dichloro-1,4-naphthoquinone were evaluated for making pulp from bagasse. Pulp from the soda-quinones process showed the lowest permanganate number and the highest yield, while the alkali consumption and rejects were decreased.



Hand sheets were tested for breaking length, burst factor, tear factor and double fold number. Bagasse pulp from the soda-quinones process exhibited the best tear factor. High alkali charges and cooking temperatures caused the delignification reaction to proceed very rapidly, particularly during the initial phase which terminated in 9 min. The most advantageous effect of quinones addition was the stabilization of the carbohydrate fraction against the peeling off reaction. All quinones derivatives pulps were characterized by increased pulp yield and decreased chemical charge consumption. The strength properties of all quinones pulps were improved. Addition of quinones (0.1% on oven-dry pulp), during pulping, improved the strength properties

**Keywords:** Bagass, rejects, quinones derivatives, Kraft pulp

## 7- APPLICATION OF MEMBRANE TECHNOLOGY IN PRODUCTION OF WHITE PLANTATION SUGAR

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(Received August 11, 2009 Accepted December 23, 2009).

Crossflow microfiltration (MF) and ultrafiltration (UF) experiments of limed mixed juice to pH of 7.5 were carried out in plate and frame module employing Polysulphone membranes to study a group of parameters not only on the flux decline but also on the quality (purity, turbidity, and color) of clear juice.

A comparative analysis in terms of flux was made using three different MF and UF membranes (i.e. 1  $\mu\text{m}$  pore size, 25 and 100 kD molecular weight cut-off, MWCO). Influence of process variables viz. transmembrane pressure (TMP) (i.e. 1.0, 1.5 and 2.0 bar) and feed temperature (i.e. 50, 60 and 70 °C) on the properties and flux of permeate were studied. The study shows that, irrespective of the operating conditions, the MF and UF permeate was significantly superior to the conventional sulphitation process in terms of purity, turbidity, and color. It was observed that the permeate flux obtained is increased as the transmembrane pressure is increased for all the membranes considered in this study. Moreover, permeate flux has been increased as the feed temperature is increased.

A part of the present study has been carried during the whole season under the conditions which led to the highest permeate flux showed that, the permeate quality was superior than that of the clear juice from sulphitation process even in the case of mixed juice deterioration. Finally, the present study demonstrated that MF and UF are technically feasible for the purification of cane juice in plantation white sugar manufacturing in the Egyptian sugar mills.

**KEYWORDS:** Clarification, Raw cane juice, Microfiltration, Ultrafiltration, Flux, Transmembrane pressure, Plate and frame cell.

## 8- CONVENTIONAL WASTE WATER TREATMENT PROCESSES AND REUSE IN DELTA SUGAR COMPANY

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### 1. Abstract

A review is conducted on conventional wastewater treatment technologies that have proven successful over few decades. The treatment processes of beet, cane and raw sugar refineries are discussed. Since the pollutants are bio-degradable, sugar factories conventionally and universally employ biological systems, and discussed the reuse of treated wastewater in Delta sugar factory to have zero effluent.



## **9- Acid-Catalyzed Oxidation of Starch Carbohydrates. Kinetics and Mechanism of Oxidation of Starch Polysaccharide by Permanganate Ion in Aqueous Perchlorate Solutions ≠**

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### **Abstract**

The kinetics of oxidation of starch carbohydrate as a polysaccharide by permanganate ion in aqueous perchloric acid at a constant ionic strength of  $3.0 \text{ mol dm}^{-3}$  have been investigated spectrophotometrically. The reaction-time curves showed two distinct stages of inverted S-shape. The initial stage was relatively slow, followed by an acceleration period over longer times. The experimental results showed first-order kinetics in permanganate and a fractional-order dependence with respect to starch concentration in both the induction and autoacceleration periods. Induced polymerization of acrylonitrile is observed indicating the free-radical mechanism. A kinetic evidence for the formation of an intermediate complex is revealed.

The reaction was found to be acid-catalyzed. The added salts lead to the prediction that  $\text{Mn}^{\text{III}}$  and/or  $\text{Mn}^{\text{IV}}$  play the main role in the reaction kinetics of the auto-acceleration final stage. The kinetic parameters have been evaluated and a tentative reaction mechanism consistent with the kinetic results is discussed.

### **Keywords:**

Catalysis, carbohydrates, starch, permanganate kinetics, oxidation, mechanism.

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## **10- Expert System Assisting Farmer Choice of Cane Delivery Equipment**

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### **Abstract**

The type of equipment implemented for cane transport may have variable effect on cane quality and losses due to delivery delay. The type of cane transport equipment may also determine labor requirements, effort, duration and cost of cane delivery operation. Variable transport means are available for infield transport and several types of equipment available for cane to mill delivery. Very limited obligatory choices may exist but the general conditions facilitate free choice. The current approach aims to identify qualifiers that may judge the performance of the equipment implemented for cane transport. Grades were decided to give a value for the performance of equipment at the existing conditions. The grade decided for each qualifier contributes the final score of an equipment to compete for free choice.

The decision Table was designed to give the score of variable possible selections of the transport system for cane transport from the field to the mill. The author who had long experience in this particular point of research updated the data directly from cane fields during the cane harvesting and delivery seasons 2009 and 2010.

Experienced farmers and field engineers were consulted through long discussions to facilitate identification of qualifiers and grades.

Decision Table was designed in which the final data for choosing the cane transport system is presented. The scores of the decision Table show that decauvelle wagons with any of the infield transport means may represent the first choice if and only if a decauvelle slide line passes at the head of the field. Equipped trailers of common size may represent the first choice for most of the general conditions and larger trailers may be the first choice for the cane regions far from the mill. The current approach may assist the farmers or a decision maker for choosing the proper equipment to transport cane either for infield transport or for to mill delivery.

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