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Effect of nitrogen fertilizer on the sugar beet quality and sugar recovery.

By

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Abstract

A formula was developed to calculate the predicted beet losses in molasses for the Egyptian sugar beet. The formula is based on tests and chemical analysis of sucrose and major non-sugar components (Na, K, and α -amino nitrogen) in the Egyptian sugar beet of various qualities during the period 2005-2011. A good agreement between actual and expected molasses sugar was obtained according to the suggested formula. A simple new equation is introduced for predicting the true sucrose values of sugar beet as a promising tool, to minimize the losses in readement of sugar recovery (%) in the sugar factories. The present investigation could be highlights on the effect of uncontrolled addition of nitrogen fertilizers on the beet sugar content, alkalinity, impurity value, and raffinose formation were evaluated and discussed. Moreover, our study helpful for setting up accurate parameters for purchasing the sugar beet in sugar factories.

Keyword: Sugar beet, α -amino nitrogen, alkalinity, beet quality.

Physicochemical investigations of Delta beet molasses for the bio-production of ethanol.

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Abstract

Bio-ethanol production through fermentation as a liquid fuel has been accepted technology for many years. Choice of renewable sugar containing substrates as feedstock for yeast fermentation depended on local conditions. Beet molasses as the most available substrate in Egypt was selected for this study. A total of 38 samples of beet molasses of the production lines I and II of the Delta Sugar Company, Egypt were collected during the season of 2010 in order to assessment their ability for bio-ethanol production. Routine physical investigations for the different physical properties of the examined samples demonstrated that there is no appreciable variation of the physical properties of these samples at the beginning of the crush season and its end. As well as the physical properties of these samples were compared with other beet molasses employed for ethanol production. The different chemical investigations which were carried out reflect the following points: i) The present beet molasses have appreciable fermentable sugar content (nearly 97 %). ii) The total nitrogen and amino acids content were in the suitable levels for ethanol production as inferred from analogous previous studies. iii) Although the concentrations of the harmful NO₂ and NO₃ were apparently high, but these values seem to be in the safe area. As well as the volatile acids concentration were comparable with other fermentable molasses. iv) The elemental phosphorous and its oxide P₂O₅ contents of the representative samples were suitable for yeast growth. v) The useful trace elements Fe, Zn, Cu, Mn and Mo were present in suitable concentrations, also, the concentrations of the toxic elements such as Cd and Pb were in the safe area.

Distribution of heavy metals in an agricultural area around a fertilizer plant near Assiut city.

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Abstract

The fertilizer industry related to the whole chain of production, storage, transport and use causes a potential pollution of air, water, soil and vegetation. A local sampling monitoring network was developed around the phosphate fertilizer plant near Assiut, Egypt. The paper reports the distribution of 5 trace elements in soils used to study atmospheric deposition in the examined area. The results obtained evidence for a local pollution of the area exposed to the emissions of the phosphate fertilizer local industry.

Hence, the scope of this study is to assess environmental impact by investigating the effects of atmospheric emissions of heavy metals in soil collected from an agricultural area adjacent to this Plant. In this connection the environmental pollution of the soil samples have been analyzed by SEM- EDS method to estimate heavy metals like Cd, Pb, Zn, Hg, and As. From this analysis a detectable variation in the trace element concentration of samples is found.

Keywords: SEM- EDS, heavy metal, phosphate fertilizer, atmospheric deposition, soil.

Equipment to replace animal power for infield cane transport in Egypt

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Abstract

Up to 20 million tons of cane is harvested and transported annually. Narrow infield roads determine the use of the traditional type agricultural trailer for cane transport. The common type agricultural trailer of dimension 2 m width \times 4 m length \times 1.2 m surface height pulled by 70 hp tractor used for infield cane transport whenever the infield road allows safe travel of the loaded trailer. The cane may be loaded parallel to the longitudinal axe of the trailer if sides are used or transverse to the trailer flat surface with no sides. The trailer can hold about 3 ton of cane. Therefore, animal drawn carts and camels have been intensively used for infield cane transport to sites at which main transport vehicles are loaded. The infield transport rate of a cart or a set of two camels may not exceed 1 ton per hour. Cane may be stored (delayed) in the site because the low supply rate from the field to the site force the farmers to start harvest and transport cane two days before delivery. The current article introduce small size trailers that can move on the narrow infield roads pulled by 15 to 20 hp tractors and perform reasonable supply rate that may serve over 80% of the cane production area.

State of the art: sugarcane mechanical loaders

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Abstract

Sugarcane loading operation mode is largely related to the level of harvesting mechanization. The full mechanization systems of sugarcane harvesting and to mill delivery may be: 1) chopper harvester (sugarcane combine). 2) Whole stalk sugarcane harvester.

In case of the fully mechanized system by chopper harvester, the sugarcane combine harvest, chop and load the cane into a parallel moving vehicle. As a fully mechanized system, infield wagons of specific design receive the cane from the harvester elevator and are hydraulically equipped to be capable for trans-loading the cane from infield wagons to the road transport vehicles. Therefore under the full mechanization system of chopper harvester (cane combine) there is no need for cane loader either in the field or on the road. In the full mechanization system of whole stalk harvester, the machine harvest the cane, clean it from dry leaves, cut the green top and gather the crop of several cane rows together in windrow. A self propelled powerful loader of swivel boom load the cane on the trailers that travel directly to the sugar factory or a continuous chopper loader pick the windrowed cane, chop it and load it to the infield wagons.

In case of the other manually harvested or partially mechanized areas, a suitable type of loader should be developed or selected. It has been observed that, sugarcane mechanization is not easy since large and expensive machines are required for full mechanization which may be more applicable to the large scale farms rather than medium or small fields. Large areas of sugarcane planted in several countries still depend on the manual harvesting because of the low reliability of the small harvesters. It has been recommended to start sugarcane mechanization with mechanizing loading operation first. The loading operation is an intensive power operation requires minimum control of the machine.

The current article aims to classify sugarcane loaders according to their main design operation concept and to explain the major conditions under which they work. The information of the article may be important to maintain selecting or developing the most design of a sugarcane loader for Egyptian conditions.

Fault diagnosis of hydraulic system

By:

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Abstract

Electromechanical and electro hydraulic systems and equipment are often faced with unexpected changes, such as component fault and variation of operating conditions. Fault diagnosis is an area that has seen substantial growth in the last few decades. The purpose for implementing fault diagnosis in industry is to increase productivity, decrease maintenance cost and increase safety. Therefore, fault diagnosis can be used not only for planning maintenance but also for allowing the selection of the most efficient equipment to minimize operating cost. The main scope of the present research work deals with a fault diagnosis in hydraulic systems. The present research work considers a hydrostatic transmission as base for analysis and diagnosis . For simulation purpose, a mathematical model has been developed. The dynamic behavior of a hydrostatic transmission is studied. Changing some system parameters causing abnormal behavior in the performance of each component. The overall system is studied experimentally and theoretically. The experimental results displayed are in a good agreement with the simulation results which are obtained using the present mathematical model. The results from experiments on the systems with the artificial fault and the system with no fault are presented. The pressure, flow and temperature ripple waveform are compared. A comparison of these three characteristics for the system with the real fault and one with the artificial fault showed very good correlation. Accurate detection of fault in a hydraulic system is a crucial and equally challenging task.

Modelling and analysis of hydrostatic transimission system BY

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Abstract

The present research work considers a hydrostatic transmission system as base for modelling and analysis. For simulation purpose, a mathematical model has been developed. The dynamic behavior of a hydrostatic transmission is studied. A computer controlled test rig is developed and the system state responses are measured. Finally, parameter variations of the volume displacement and the motor torque are introduced to the system in order to study their effect on pressure and hydraulic motor speed. The overall system is studied experimentally and theoretically. The experimental results displayed are in a good agreement with the simulation results which are obtained for the present mathematical model.

Study of the effects of using acetic acid in condenser de-scaling on the exhaust emissions and the performance of Assiut thermal power plant.

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Abstract

In the present study, an investigation of the effect of using acetic acid (CH_3COOH) in condenser de-scaling on the exhaust emissions and the performance of Assiut Thermal Power Plant. Efficient condenser operation maintains turbine efficiency; benefits consumers by reducing the amount of emissions. Condenser vacuum has a great effect on the unit efficiency to a degree that it reduces the generated load by 112 MWh (35.9%) in unit one of Assiut Power Plant and to the extent that cleaning became very necessary. From environmentally point of view an organic, biodegradable, locally produced, effective and cheap de-scaling agent was the very applicable one and this meet with acetic acid. Actually, condenser cleaning leads to an improvement in the turbine efficiency and raises the maximum load generated from the unit (from 200 MWh before cleaning to 290 MWh after cleaning), decreases fuel consumed for MW (from 249 kg/MW at load 200 MWh to 220 kg/MW at load 290 MWh), reduces the overall fuel consumption, consequently, reduces emissions as CO, CO₂, SO_x, NO_x, ground level ozone, PM, VOC, dioxin, ashes, solid deposits, haze, thermal pollution, and reduces contribution to global warming, acid rain, heat island effect at Assiut city. In brief, the condenser cleaning process reduces the environmental pollution from the unit which in turn minimizes the health impact of these pollutants.

Keywords : Power plant, Condenser de-scaling, Air pollution.