PENERAPAN TEKNOLOGI KARANTINA: UPAWA MEMBUKA PELUANG EKSPOR BUAH-BUAHAN INDONESIA

Application of Quarantine Technology: An Opportunity to Increasing Export of Indonesian Fruit

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Abstract

Export of Indonesian fruit is constrained by very tight quarantine regulation, because the produces are host for Tephritidae fruit flies that are considered a quarantine risk by many importing countries. To be accepted by importing markets, the produces must be treated to ensure that it is free of the fruit flies. Since the banning of the use of chemical method for insect disinfestation process like ethylene dibromide (EDB) in 1984, a new method by means of heat treatment was developed as a quarantine technology. This method has been applied in several fruit exporting countries like Australia, the Philippines, Taiwan and Thailand. Heat treatment in postharvest handling is a method of heating fruit to kill insects eggs and larvae of fruit flies before fresh market shipment without damaging the produces themselves. Many factors influence the heat on postharvest fruit quality such as cultivar, fruit size, morphological characteristics, stage of ripeness, and treatment method. Therefore, the application of this technology needs to be assessed on fruit by fruit basis in order that the objective of killing pests/diseases can be achieved without adversely affecting the market quality of the fruit.

Keywords : Quarantine technology, heat treatment, pest and disease, disinfestation.
PERKEMBANGAN SISTEM PERAWATAN MESIN DI INDUSTRI PROSES

The Development Of Maintenance System In Industrial ProcesS

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Abstract

For most companies, maintenance represents a very significant function within the over production environment. The developments in automation, and the resulting complexity of the systems involved, have made the reliability of the machines even more important. This especially true in the process industry, characterized by expensive specialized equipment and strict environmental considerations. Competition and the drive for profits are forcing companies implement various productivity improvement efforts. Maintenance function, although is to serve production, has a fundamental role since it has a direct effect over competition through impact in productivity (global costs reduction).

Keywords: Maintenance, Productivity, Industrial Process.
Technical Paper

EFEKTIFITAS KOMBINASI PENGHANGAT AIR TERKENDALI PADA SISTEM RESIRKULASI AIR UNTUK PEMBENIHAN IKAN

(Effectiveness of a Combination of Controlled Water Heaters in Water Recirculation System for Fish Hatchery)

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Abstract

Efficacies in hatchery depend on the ability to control water temperature. The aim of this research is to reduce heat loss in hatchery room, so that the energy requirement for water warming will be more efficient. Two units of flat plate solar collectors were serially installed. On-off controller is used to control a fan which is used for air re-circulation in 6m x 4m x 3m closed room. Experiments were carried out to find effectiveness of solar collector as a controlled warmer unit by perceived both temperature and relative humidity parameters. Initial experiment results indicate that solar collector as a warmer unit is able to give mean room temperature with low standard deviation. The statistical analysis results also indicate that the mean water temperature at the controlled air re-circulation system with circulating water is equal to 27.6 °C with standard deviation equal to 0.7 °C. Additional 350 Watt of electric water warmer can increase the mean water temperature that is equal to 30.6 °C with standard deviation equal to 0.5 °C. It concludes that the combination of solar collector and electric water warmer as a controlled warmer unit is able to give mean water temperature with low standard deviation, so that this system can effectively reduce the use of warming energy cost until 76.85 %.

Keyword : Solar collector, temperature, control, hatchery
Technical Paper

RANCANGAN HIDROLIKA IRIGASI TETES UNTUK TANAMAN SEMANGKA DI LAHAN KELOMPOK TANI SEROPAN MAKMUR, KABUPATEN GUNUNG KIDUL, D.I. YOGYAKARTA

Hydraulics Design Of Trickle Irrigation For Water Melon Farming Of Seropan Makmur Farmers’ Group, In Gunung Kidul, Yogyakarta

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Abstract

Hydraulic design of trickle irrigation sub unit is very important to achieve high irrigation uniformity and efficiency of its schemes. The sub unit is a pipeline in a trickle irrigation block which is consists of a manifold line, some laterals and emitters. The hydraulic criteria has been used in the design of trickle irrigation scheme for water melon (Citrullus vulgaris L.) at an existing pipeline system of surface irrigation scheme in Seropan Area, Yogyakarta. The hydraulic criteria includes pipeline hydraulics of lateral and manifold, system capacity, and total dynamic head. The number and size of sub unit has been designed, and the head losses (hf) at lateral and manifold were \( \leq 11\% \) and \( \leq 9\% \) of emitter operating pressure (Ha) respectively. Theoritically, variation of emitter discharge will vary at 1.16-1.61%.

Keywords: Hydraulic criteria, lateral, manifold, sub unit, trickle irrigation, uniformity
Abstract

The Government of Republic Indonesia had positively responded the emerging of new paradigm on irrigation management. Government Act No. 7/2004 on water resources as well as the new Government Regulation No. 20/2006 on irrigation state about concept on good governance in management of water resources as well as irrigation management. One of implementation of the concept is application of irrigation management asset. The Department of Agricultural Engineering, Gadjah Mada University, Yogyakarta had been developed the concept of irrigation asset management plan since 1995. This paper aims to discuss the concept development and its implementation in several irrigation systems in Java. Even though some constraints were also found, in some extend the implementation of irrigation asset management plan could help the management of irrigation system in providing several information in transparent way to all stakeholder especially farmers.

Keywords: New paradigm, irrigation management, asset management plan
Abstract

A heat transfer model has been developed for a naturally ventilated greenhouse under the tropical climatic conditions. In the tropical region, greenhouses are characterized by high exposure in solar radiation and air exchange through natural ventilation. Therefore in this research incident angle of solar radiation on the greenhouse roof surface has been considered as an important factor to improve the accuracy in calculating the radiation received by the greenhouse. The heat transfer model consists of four layers represent the cover, inside air, floor surface and soil layers of the greenhouse. The model was applied to a naturally ventilated standard-peak greenhouse. A computer program was developed to predict the temperature of the inside air. Incident angle of direct solar radiation on roof surface and outside microclimate parameters data were used as the input values. Heat transfer equations were solved by using the Runge-Kutta Method while the angle of direct solar radiation with the roof surface was calculated by using the principles of geometry. Results show that the model performed well in predicting the temperature of the inside air as compared to that of the measured value.

Keywords: Greenhouse modeling, temperature prediction, incident angle of solar radiation
Technical Paper

PENGEMBANGAN MODEL JARINGAN SYARAF TIRUAN UNTUK PENDUGAAN SUHU UDARA DI DALAM RUMAH KACA

Development of Artificial Neural Network Model for Prediction of Greenhouse Air Temperature

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Abstract

During the daytime in tropical region, air temperature inside the greenhouse higher than the outside air temperature. The prediction of air temperature inside the greenhouse can be done by using Artificial Neural Network (ANN) model. The neural network model consist of three layers, there are input layer, hidden layer and output layer. The input layer consist of eight nodes, there are wind velocity, air humidity, air pressure, outside air temperature, daily rainfall, solar radiation, roof temperature and floor temperature. The output layer is inside air temperature of the greenhouse. The ANN models were developed with different proportion of training and validation data. Validation of the model had been done by using standard error prediction, bias and Coefficient of Variation. It had been shown that the ANN model could explain the complicated relationship among greenhouse parameter, effectively.

Keywords: Artificial neural network, greenhouse, inside air temperature prediction.
MEKANISME DAN TORSI PENGEPASAN TUNGGUL TEBU MENGGUNAKAN PISAU BAJAK PIRING YANG DIPUTAR

Mechanism and Cutting Torque of Sugar Cane Stubble by Using Rotating Disk Plow

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Abstract

Cutting of sugar cane stubble is one of important activities in sugar cane agriculture system. Problems on labor and low quality of cutting have not been solved by manual cutting system. In addition, a kind of farm machinery, which work in rotating ways did not give a good result in doing the cutting of sugar cane stubble. Due to low quality of cutting and broken sugar cane stubble, it is not used any more. The problem of broken sugar cane stubble in mechanical cutting system should be solved by changing the system of cutting mechanism, preferring impact cutting to chips forming. The goal of the study is to analyze the mechanism of cutting on sugar cane stubble by using rotating disk plow and to develop a mathematical model in order to determine cutting force of sugar cane stubble. Method of analyzing on movement of node on edge is used to discribe a curve of edge movement. A mathematical model of cutting force was developed base on instant cutting area which was calculated using Simpson method, numerical integration system. Equations resulted from this study can be applied to simulate the movement of edge using input parameters, mainly: tilt angle, disk angle, angular velocity, linier velocity. Variety of PA 198 has the higher specific cutting resistance per area of cutting than the other varieties. The mathematical model developed can be used to determine the cutting force with a good result.

Keywords: Ratoon, sugar cane stubble, torque, cutting, disk plow
KAJIAN ENERGI KEMOREAKSI KAPUR API UNTUK PENGERINGAN BENIH CABE MERAH
(Study on Chemoreaction Energy of Quicklime Stone for Drying of Red Chilli Seeds)

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ABSTRACT

This research was aimed to study the energy potential of quicklime stone chemoreaction for the application to drying process of red chilli seeds. The experiment demonstrated that chemoreaction energy released from water reaction with CaO containing lime stone could be used for drying process of chilli seeds at ambient temperature to a very low moisture, varying of 2.5 – 3.7 % wb. The chemoreaction energy released from reaction between lime stone and plain water was 1.06 kJ/g lime stone. At excessive water condition particle sizes of lime stone did not affect chemoreaction energy, but smaller size particles enhanced the energy release from the reaction. Using three particle sizes of lime stone the energy efficiency for drying of red chilli seeds ranged 54.0 – 64.0 % and for plane water evaporation ranged 57.4 – 71.6 %. The energy effectiveness for chilli seeds drying was 4.7 kJ/g water and for plane water evaporation was 4.1 kJ/g, implying the presence of bound water in the chilli seeds.

Keywords: Quicklime Stone, Chemoreaction, Drying, Red Chilli Seed
ANALISIS KESALAHAN PERHITUNGAN LAJU ALIRAN UDARA PADA PENDINGINAN RUMAH TANAMAN DENGAN SISTEM PENGKABUTAN

Error Analysis on the Calculation of Air Flow Rate in Greenhouse Cooling with Fogging System

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Abstract

Greenhouse cooling with fogging system is important to be studied in improving design of greenhouses. The process is not about cooling the air only but also humidifying. This study aims at evaluating the variables that contribute on error in air flow rate calculation. Furthermore, effects of enthalpy reading from the psychrometric chart on air flow rate calculation has been studied also. Herewith, parameters optimization and error analysis of the air flow rate equation were carried out. Data was taken from a multispan greenhouse which had cover material of PE 150 µm, 105.6 m wide and 205 m length, and three channels consists of 82 nozzles. The result indicates that the enthalpy has more pronounced contribution to determine the air flow rate and it follows successively by temperature and sun radiation. Thus, precise reading of the enthalpy is highly necessary to minimize error of the calculation of the air flow rate. This method of analysis is applicable to find appropriate values of enthalpy and other variables to produce optimum air flow rate in greenhouses.

Keywords: Greenhouse, Evaporative Cooling, Air Flow Rate, Error Minimization.