

HERSONISSOS, CRETE - GREECE
23 - 25 JUNE 2008

AgEng08
Agricultural & Biosystems Engineering for a Sustainable World



AgEng2008

International Conference on Agricultural Engineering

Agricultural & Biosystems Engineering for a Sustainable World



**Knossos Royal Village, Hersonissos - Crete
23-25 June 2008, Greece**

BOOK OF ABSTRACTS

www.ageng2008.com

technical point of view. In particular, the first one influence the calorific value of the biomass and involve problematic concerning the disposal of the combustion inorganic residue. The ash behavior is important for the hauling and slagging phenomena responsible of reducing in energy efficiency and damaging on the internal part of the combustion system. Twenty samples of different biomass was analyzed measuring the ash content and the ash behavior following the relative technical normative. The laboratory data were analyzed on the base of a classification criteria able to synthesize both parameters observed. The results have shown the possibility to identify homogeneous group of biomass based on ash qualitative and quantitative characteristics. Wood biomasses and in particular multi-annual wood crops are resulted with best quality in comparison with herbaceous biomasses and more with amylaceous products characterized by low fusion temperature.

OP-1062

EFFICIENCY AND EMISSION OF BIOMASS BOILER PLANTS IN SERBIA*Štanić M, Janić T, Dedović N**University of Novi Sad, Department of Agricultural Engineering, Novi Sad, Serbia and Montenegro*

Abstract Usage of crop residues as biofuel has a long tradition in rural areas of Serbia - the province of Vojvodina. After the breakout of the first world energy crisis, the provincial government stimulated the re-introduction of crop residues as fuel. In the last twenty years a lot of different thermal plants have been developed and applied in practice. Also, numerous biomass-fueled boilers were built during the 80s. Among those were small boilers for household heating, with thermal power up to 50 kW, medium-size for farm and greenhouses, with thermal power 50 to 1000 kW, and large facilities for processing of agricultural products, with thermal powers higher than 1000 kW. Efficiency and emission of pollutants were measured in several cases only. Measurements have shown that most of the boilers have low thermal efficiency. It is also the signal for high emission of pollutants. There are no domestic legislative and professional guidelines related to this issue. The objective of this paper is to propose specific conditions for boiler testing, as well as for creation and application of domestic legislation. Also expected are recommendations for desirable range of boiler efficiency and pollutants emission. Key words: boilers, biomass, efficiency, emission, legislation.

Fruit and Vegetable Cultivation Systems I (195)

OP-1065

SUPERVISION OF OVOPRODUCTS SPOILAGE WITH RED LED LIGHT*Carreo E, Diaz-Barcos V, Barreiro P, Gonzalez M, Fuentes-Pila J**Universidad Politécnica de Madrid, Science and Technology Applied, Madrid, Spain; ²Universidad Politécnica de Madrid, Rural Engineering, Madrid, Spain; ³Universidad Politécnica de Madrid, Food Technology, Madrid, Spain; ⁴Universidad Politécnica de Madrid, Madrid, Spain*

Heat-treatment of ovoproducts is often required to ensure microbial safety. However, it has been shown that in most microbial species slow heating, or heat shocks may induce a higher heat resistance, that means that it is not possible to remove the microbial flora completely. These microorganisms produce on ovoproducts spoilage especially when the cold chain is broken along the transportation and/or storage. As a result, the life span for the product is shortened. The microbial activity inside the product causes changes in several physical properties, which can be supervised using optical methods. The aim of this work is to monitor the sigmoid behaviour underlying the ovoproduct evolution and spoilage by means of red LED light. For two commercial types of liquid and pasteurized egg white, storage at 9°C, an average correlation of $r=0.94$ has been found between microorganism growth and images mean grey level of LED light passing through the sample. The results show that it is possible to develop very simple predictive models taking into account only one optical parameter corresponding to a single LED.

OP-1070

MODEL-BASED MANAGEMENT OF SALT ACCUMULATION IN A TOMATO CROP GROWN IN CLOSED-CYCLE HYDROPONIC SYSTEMS*Savvas S, Lycokanellos G, Mouzakis G, Tsiros I, Sigrimis N, Varlagas H, AUA, Plant Science, Athens, Greece; ²AUA, Department of Agricultural Engineering, Iera Odos, Athens, Greece*

Closed-cycle hydroponic systems are environment-friendly, since the disposal of fertigation effluents to the environment is drastically reduced or even eliminated. However, a long-term recycling of the leachate solution may result in accumulation of sparingly absorbed ions in the recycled nutrient solution. Previous research has indicated that the concentration of salt ions such as Na and Cl in the recycled nutrient solution may be predicted by employing mass-balance models and monitoring the plant water consumption. The aim of the present investigation was to calibrate and validate such a model in hydroponically-grown tomato crops. The model successfully fitted the measured Na concentrations in the drainage solution. Based on the predicted course of Na accumulation in the root zone, it was possible to adjust the target EC of the outgoing irrigation solution thereby optimizing the nutrient supply and minimizing the discharge of drainage solution. Our results indicate that the target EC of the outgoing irrigation solution can be adjusted automatically in real time in closed-cycle cultivation systems, merely by monitoring one variable, namely the cumulative consumption of water by the crop.

OP-1075

INFLUENCES OF IRRIGATION SCHEDULES AND SUBSTRATES ON FRUIT QUALITY OF TOMATO (CV. HAMRA) IN SOILLESS CULTURE*Shahinrokhshar P, Davary K, Ghahreman B**¹Rice research institute, Rasht, Iran; ²College of Agriculture, Ferdowsi University of Mashhad, Water engineering, Mashhad, Iran; ³Ferdowsi University of Mashhad, College of agriculture, Mashhad, Iran*

No summary submitted.

OP-1085

POTENTIAL HEAT STORAGE IN THE FLOOR OF AN INTEGRATED BARN-BIOFILTER-GREENHOUSE SYSTEM*Mahmood K, Mann D**University of Manitoba, Biosystems Engineering, Winnipeg, Canada*

An integrated barn-biofilter-greenhouse system has been designed. Exhaust air from a hog barn is passed through a biofilter to remove the odour before the air is introduced into a solar energy greenhouse. This paper compares the potential of gravel, soil, and woodchips for passively storing energy inside a solar energy greenhouse. The experiment was conducted in February 2007 inside a solar greenhouse at St. Francis Xavier, MB (49°N and 97°W). The maximum and minimum average hourly temperatures inside the greenhouse were recorded as 19.6 and -1.2°C, respectively. Three identical bins (0.024 m³), insulated by 152 mm thick layer of fibreglass, were used to store gravel (bin 1), woodchips (bin 2), and soil (bin 3) inside the solar greenhouse environment. Calculations have been made to compare the heat energy storage of gravel, woodchips, and soil at depths of 76, 152, and 229 mm. All three materials stored maximum heat at a depth of 76 mm, with gravel reaching the highest temperature gain of 21°C at 14:00h. Fluctuations in temperature decrease as the material depth increases. It has also been observed that approximately 53 and 73 kJ more daily average heat energy is stored by gravel as compared to soil and woodchips, respectively.

Ergonomics, Safety and Health II (200)

OP-1095

ESTIMATION OF DUSTINESS OF STRAWS AND DUST EXPOSURE*Takai H, Dahl P**University of Aarhus, Agricultural Engineering, Horsens, Denmark*

Straw is a fragile material. Thus, it can be assumed that straws produce dusts as long as they are exposed to strong enough impaction. It was also assumed that the dust generation from straws depends on the level of the impaction applied on the material. A new dustiness tester has been developed based on these assumptions. It is consisted of a modified small ball mill and a particle counter. The ball mill is consisted of: 1) a ceramic cylinder, which rotates around a horizontal axis, 2) ceramic balls as grinding media, 3) a regulator to control the rotation speed and to alternate its direction, 4) an air intake filter and 5) a dust sampler tube, which is connected to the particle counter. Dust exposures of a worker spreading the straw materials, of which dustiness indices were determined by the new method, have been estimated in a wind tunnel to examine the relevance of the obtained dustiness data. The new dustiness tester showed capability to obtain useful data to estimate levels of dust exposure of a worker, who spreading straw