

Fungal Infection in Potato Tuber Using Thermal Imaging

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ABSTRACT

Potato dry rot is one of the most detrimental diseases affecting potato tubers caused by *Fusarium solani* fungus. In order to prevent the expansion of potato dry rot and the losses caused by this disease, the fungi must be detected and destroyed. The common methods for detecting contaminations are time-consuming, expensive and painstaking. In this study, a fast and reliable method has been presented based on active thermographical technology. This method was employed to detect the healthy tubers from contaminated ones and to classify the different stages of contamination (1 to 9 days following infection). In the active thermography, two heating temperature levels and four cooling time level plus were applied on the samples. The results of variance analysis and a comparison of the mean of the average temperature differences between the surfaces of the healthy and contaminated tubers indicated that 90°C heating temperature and 40°s cooling time of the samples was the best treatment for detecting healthy vs contaminated tubers. For evaluation of the classifier performance, statistical indicators such as accuracy, precision, sensitivity and specificity were assessed. The total accuracy of the classifier was 96.67% .The results of the present study illustrate that the applied method in this research is one of the most effective methods of machine vision for determining the quality and soundness of food and agricultural crops.

Keywords: Fungal Infection, *Fusarium Solani*, Thermography, Support Vector Machine.

An Investigation of the Agricultural Soil Shear Strength under the Freezing and Thawing Process

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ABSTRACT

Soil as the bed of agricultural and horticultural crops productions is one of the most important factor of agricultural production. It is composed of fine particles the space among the particles of which is filled by water and / or air. A suitable combination of soil, water and air is necessary for growing of crops. The freezing and thawing process is one of the natural factors that improves the soil structure by improving the soil physical and mechanical properties. In this study, for investigation of soil shear strength under the freezing and thawing conditions experiments on soil samples were performed. For this purpose, the soil shear strength was investigated in $-10\text{ }^{\circ}\text{C}$ as a freezing temperature, with two humidity levels (10 and 15%) and three levels of density. The results indicated that the freezing and thawing process decreases the soil shear strength. In the investigated range of soil density, by increasing soil density, the effect of freezing and thawing on soil shear strength was increased. This can lead to reduction of required power for tillage in arable land following the freezing and thawing processes.

Keywords: Soil shear strength, temperature, humidity, density

Technical and Economical Effects of Residue Management and Time of Post-Irrigation in Wheat Raised Bed Planting

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ABSTRACT

A split-block experiment of three replications was employed to study the effects of residue management and post-irrigation regimes on wheat yield, water use and cost and as well the benefit of treatments. Three levels of residue management, comprised of: burning entire crop residue (B), removal of part of the crop residue by use of stalk shredder (R), removing partly by of crop residue, using stalk shredder and some through moldboard ploughing (RP), were considered as main plots. Three treatments of post-irrigation regimes including irrigation at 7 days after planting (I₇), irrigating 14 days following planting (I₁₄), and irrigating 21 days after planting (I₂₁) were considered as sub plots. Results of economical analysis indicated that the most proper treatment was RI₂₁ that increased profitability by 1220000 Rial/ha relative to the control treatment.

Keywords: Benefit, Water use, wheat

Fabrication and Evaluation of Pressurized Metering drum Performance (Equipped with a Mechanical Separator) by Grease Belt

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ABSTRACT

A pressurized metering drum was fabricated and evaluated by grease belt. The experiment was conducted with three levels of inner pressure drum; 600, 850 and 1050 Pa and three levels of planter forward speed namely; 0.5, 1 and 1.5 m/s, by mechanical separator methods **in three replications**. The results of a factorial experiment with a completely randomized design was evaluated and data comparison performed by using LSD test in SAS software. Effect of inner pressure drum and planter forward speed on the filling, multi-planting, no-Planting, deviation from line of cultivation and seed distribution uniformity were evaluated. Results indicated that the interaction effect between speed and air pressure on filling, no-Planting and multi-planting was significant at 1% level. The level of air pressure and speed didn't affect the level of deviation from line of cultivation and also more uniform distribution of seeds was done under low air pressure.

Keywords: Planter, Precision cultivation, Filling percent, Line of cultivation, Seed distribution

An Investigation of Organoleptic and Physicochemical Properties of Functional Set Yogurt Incorporating Oat Milk

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ABSTRACT

Oat is becoming popular as part of a healthy diet and new oat products emerge at the functional food markets. The aim of this study was to combine the valuable nutritional properties of cereals and milk, to produce functional yogurt product containing oat milk and to evaluate its physicochemical, microbiological and sensory characteristics. Throughout the present study, replacement of 0, 10, 15 and 20% (V/V) oat milk with low-fat milk (2.5%) was performed and its effect on physicochemical and sensory characteristics of probiotic yogurt, was evaluated. Results indicated that with increasing the percentage of oat milk in yogurt, pH, dry matter and fat content decreased while acidity, syneresis, protein and phenolic compound contents increased significantly ($P<0.05$). On the other hand, with and addition of oat milk, iron and fiber contents increased.

Keywords: Cereal, Dairy, Functional, Oat, Yogurt

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Design of an Algorithm for Pruning Grapevine as Based on 3D Image Processing

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ABSTRACT

Using intelligent pruning machines can be employed to reduce the labor required for pruning. It was attempted in this study to develop an algorithm that uses stereo vision technique to identify which parts of the grapevine should be cut. The images were taken from gardens of the Research Center for Agriculture and Natural Resources, Fars Province. Excessive branches of plants were segmented from their main branches, then the main trunk and one year old branches were identified and pruned as based upon the criteria for pruning, the main skeleton of the grapevine being determined. Making use of this skeleton, the attaching points of the branches were obtained on the trunk. Distance between the branches was maintained. Then the algorithm was evaluated, the evaluation results of the algorithm showed that the proposed algorithm presented an acceptable performance with the pruning points of the grapevines correctly detected. The accuracy of the developed algorithm was estimated as 97.2 percent.

Keywords: Stereo Vision, Image Processing, Machine Vision, Grape vine pruning.

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Performance Evaluation of the Most Common Multi Criteria Decision Making Techniques to Rank the Effective Parameters in the Agility of Distribution Chain of Combine Owners in Fars Province

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ABSTRACT

Decision making is one of the important and basic tasks of management, the achievement of the organizational goals of which depends on the quality. Multi criterion decision making is among the decision making techniques run through the application of quantitative data. It helps the manager, by considering different factors, some of which may be in conflict, to make a rational decision. The purpose of this research is to present a plan to approximate a decision making discrete space using optimization models to reach an ultimate criterion to compare and analyze the performance of conventional strategies of multi criteria decision makings. The mentioned method, which is a compilation of quality and quantity approaches has been attempted and implemented in a case study to rank the effective parameters in agility of the distribution chain of combine owners in Fars Province. Three such conventional methods as Weighty and TOPSIS as well as electrical were employed to rank the effective parameters. Outcome results within the three methods were different and were integrated by means of triple integration. Such module ranking of parameters as sensitivity, response to market and customer, speed in carrying out of the circumstance as well as introduction of new products were placed in first rate. Following that, appropriate planning, cost reduction, using IT, process and task integration, customer satisfaction, flexibility, quality of service providence and development of staffs' skills within second to ninth were ranked respectively. Finally, the unity of results of TOPSIS method and results of triple integration were shown, where shown TOPSIS method was specified as the most appropriate method for ranking the effective parameters in agility of distribution chain as related to combine owners.

Keywords: Multi criterion decision making, Agility, Distribution chain, Combine owners' cooperation.

Corn Drying in a Laboratory Scale Ultrasound-Assisted Fluidized Bed Dryer

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ABSTRACT

Several studies have been conducted on equipping conventional fluidized bed with some technologies to increase the drying performance as well as its efficiency. To achieve the goal a combination of high power ultrasound equipment seems to be most appropriate. The main objective of the present study was to investigate the influence of high power ultrasound on laboratory fluidized bed drying of corn in terms of drying kinetics and mechanical characteristics of corn the crop at three levels of ultrasound power density (11.1, 14.6 and 18.7 kW m⁻³), three levels of drying air temperature (30, 40, and 50 °C) and four levels of frequency (20, 25, 28, and 30 kHz) in which the moisture content was reduced from 32±0.5 (%d.b.) to 17±0.5 (%d.b.). Results revealed that the frequency of 25 kHz was the most efficient in terms of drying time. The frequency of 25 kHz and power density of 14.6 kWm⁻³ was the most efficient frequency and caused a reduction of the drying time by 43% in comparison with none ultrasound condition (control). The sponge effect caused by ultrasound application led to reduction of ultimate compressive strength and toughness of the dried samples. According to the results, toughness as compared with the ultimate compressive strength was an appropriate index of the grain hardness.

Keywords: Mechanical attributes, high power ultrasound, corn

Optimization of Pullulan Production from Pomegranate Waste by *A.pullulans*

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ABSTRACT

Optimization of fermentation conditions for pullulan production by use of *Aureobasidium pullulans* (KY767023) taken from pomegranate waste was investigated. Response surface methodology was employed to evaluate the effects of three factors (initial pH, inoculum size and ratio of liquid to solid) on pullulan yield in Solid-State fermentation (SSF). Results indicated that maximum pullulan concentration (50.5 ± 0.35 g/kg) was obtained at the optimum levels of the process variables (initial pH 7.75, inoculum size 5% v/v, ratio of liquid to solid 1:2.5). Furthermore, physicochemical characteristics of the obtained pullulan at their optimum conditions were assessed. The emulsifying activity of extracted pullulan was recorded 63%. The emulsion stability was 60.5% at 4 °C and 58.5% at 25 °C after 30 days past of storage. The results of viscosity curves at different concentrations demonstrated that the solutions of pullulan at their low concentrations (0.1-0.5 % w/v) exhibited nearly Newtonian flow behavior, and as the concentration of pullulan solution increased, the behavior changed from Newtonian to pseudoplastic flow. FT-IR of the pullulan produced from pomegranate by-products revealed the presence of α (1 \rightarrow 6) linked maltotriose units.

Keywords: Pullulan, Pomegranate waste, Response Surface Methodology, Inoculum size, FT-IR

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Optimization of Environmental Conditions for Production of Kefiran by *Lactobacillus kefiranofaciens* via Response Surface Methodology

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ABSTRACT

Production of Biopolymers, by means of different microorganisms, for industrial applications has been considered in recent years. *Lactobacillus kefiranofaciens* bacterium produces exopolysaccharide existing in kefir grains called kefiran. The objective of this study was the optimization of environmental conditions to produce kefiran polysaccharide in a synthetic media as based on whey substrate by use of response surface methodology (RSM). Therefore, different combinations of factors including pH (4.7-6.3), temperature (23-37° C) and agitation rate (70-170 rpm) on production of kefiran (g/L) were studied. According to the results, the optimum condition for production of kefiran included pH equal to 5.7, 31° C and agitation rate of 127 rpm which led to the production of 1.14 g/L kefiran within five days of incubation period. Furthermore, the molecular weight of produced kefiran in pure culture of *L.kefiranofaciens* evaluated through gel filtration chromatography was recorded 1.1×10^6 Da.

Keywords: Exopolysaccharide, Kefiran, *Lactobacillus kefiranofaciens*, Response Surface Methodology

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Design, Fabrication and Best Position Determination of an Electronic System for Temperature and Humidity Control in Avicultures

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ABSTRACT

Throughout the following study an avicultural electronic measuring and control system was developed. To determine the most appropriate location for sensors to achieve the minimum temperature and RH gradient in aviculture, 60 points in different locations, were considered and the effect of length, width and height of sensor installation location on actual temperature and RH of the salon as well as energy consumption of equipment were conducted using a set of factorial tests. The results revealed that placing the electronic system on the longitudinal, latitudinal and altitudinal distances of respectively 23.5, 1.6 and 0.75 m led to the closest average aviculture temperatures and RHs to the set points. Meanwhile, the minimum electricity consumption was obtained when locating the electronic system on the longitudinal, latitudinal and altitudinal distances equivalent to 1, 3.2 and 0.5 m, respectively.

Keywords: Temperature; Energy; Aviculture; electronic control

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Effect of Drying on Corn Seed Viability

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ABSTRACT

Drying can increase seed longevity. On the other hand, drying process is a critical step in seed production and is a frequent cause of seed injury and loss of germination potential. The objectives followed in the present study were to determine the effects of drying factors on corn seed quality (germination percentage). The seeds were dried at three temperatures (33, 37 and 43°C), and three air flow rates (0.045, 0.09 and 0.135m³/s). After completion of the drying, germination test was conducted just after drying as well as the six months past of drying. The results showed that damage to the embryo seeds will not be shown immediately after the drying process. The results indicated that in all the tests, the effect of drying temperature on germination rate is significant (at 1% error level), but the impact of air velocity is not significant (at 5% error level). The most appropriate percentage of germination in 38 °C temperature and the air flow rate 0.045 m³/s within a duration of 141 minutes accompanied with the lowest energy consumption.

Keywords: Drying, corn seeds, germination.

Design and Development of a Portable Sprayer launched on date Tree Crown

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ABSTRACT

Ommatissus binotatus is the most dangerous insect in Bam area that attacks the date palm trees causing the date growers seriously suffer from the losses it exerts to the crop yield every year. The ground and air spraying methods are not effective and each has their own weaknesses. The proposed method is spaying the tree from a height of one meter over the crown by a small sprayer on the tree. The sprayer is triggered by means of a remote control system. The sprayer was made and tested throughout this research work. The sprayer was tested for droplet size and spraying pattern by means of two micro jet nozzles. The data were collected for three pressure levels and three distances from the sprayer within three replications. The droplet size distribution was reflected through water sensitive papers. The data were analyzed by means of Image 1.38 X , Minitab and SAS software. The results revealed that the sprayer equipped with the mini sprinkler micro jet nozzle produces a uniform spring pattern together with uniform droplet sizes at all pressure levels. The sprayer is also a promising device for a sensor networking program.

Keywords: *Ommatissus binotatus*, remote control, spraying pattern, micro jet, nozzle

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Assessment of the Energy Flow and Environmental Impacts of Greenhouse Production of Medicinal Plants Considering Life Cycle Assessment Approach- Case study of Aloe vera

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ABSTRACT

Throughout the present study the production of greenhouse Aloe vera leaves in Khorasan Razavi province was evaluated and analyzed in terms of energy consumption pattern and as well environmental consequences due to the use of agricultural inputs. As indicated by the results, total energy consumption in production of Aloe vera leaves was evaluated as 102825.19 MJ ton⁻¹. The results of energy analysis showed that the heat supply and greenhouse structures took more than 90 percent of total energy consumption. Based on the results of life cycle assessment, the total amount of environmental impacts for greenhouse production of one ton of Aloe vera leaves was determined as 2331.26 pPt ton⁻¹, in which the contributions of the input production outside the greenhouse and the input consumption inside the greenhouse amounted to 1744.63 and 586.63 pPt ton⁻¹, respectively. The results revealed that the impact categories of human toxicity and marine aquatic ecotoxicity (with environmental impacts of 621.043 and 608.538 pPt ton⁻¹, respectively), contributed the highest share to the total environmental impact.

Keywords: Aloe vera, Energy, Greenhouse, Life cycle assessment, Medicinal plants.

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Economic Feasibility of Producing Energy from Livestock Waste through DRANCO Anaerobic Digestion Process

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ABSTRACT

The fast growing trend of world energy consumption has created the recent energy crisis of the world. The use of proper renewable energy can have a special prominent place in Iran due to the growing need for energy on the one hand, and the diminishing fossil fuel resources on the other. Protection of the environment, reducing the present air pollution, and provision of electricity and fuel for the villages are among the criteria that must be taken into account. Due to the significant extent of the annual production of biomass sources in Iran the need for using these resources for biogas as energy production is high. The production of biogas using anaerobic digestion technology and its application in CHP plants in Iran can supply a part of the required energy and achieve sustainable development. In this study economic calculations have been done for biogas plant as a case study for combined heat and power production. The results revealed that during the project life (20 years), the Internal Rate of Return (IRR) was 19%, the net present value (NPV) equal to 180,587,908 and the benefit to cost ratio equal to 1.032. Financial evaluation of energy production for this system revealed that the process sounds economical to be run.

Keywords: Feasibility, Biogas, Dranco, Anaerobic digestion

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