

Effect of Sesame Meal and Soluble Soybean Polysaccharide on Properties of Barbary Bread

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ABSTRACT

With the aim of improving the quality of Barbary bread, the effect of adding sesame meal (0-12.5%) and soluble soybean polysaccharide (0-2%) on some physio-chemical (moisture, protein, fat, fiber, ash, specific volume, firmness and cohesiveness) and organoleptic characteristics of Barbary as dependent variables were investigated using response surface methodology. The results showed that the addition of sesame meal increased the amounts of ash, protein and fat, while the firmness and cohesiveness of bread decreased significantly. Also, it was revealed that adding soluble soybean polysaccharide increased moisture content and reduced significantly the firmness and specific volume of samples. The addition of sesame meal and soluble soybean polysaccharide had positive effects on the overall acceptability of the bread. Based on the optimized results and obtained model, the application of 6.43% of sesame meal and 0.62% of the soluble soybean polysaccharide can be produced Barbary including the best quality and nutritional and sensory features.

Keywords: Flat bread, Fiber, Texture, Organoleptic properties, Response surface methodology

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Simulation of Online Optimal Path Planning of Machinery in Triangular-Shaped Fields Using Genetic Algorithm

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ABSTRACT

Nowadays the development of machinery automatic guidance systems has led to exceeding enthusiasm for route planning, using computational tools of artificial intelligence. Farms are of different and various shape and plan. Since a route is not of the same length throughout a triangle-shaped field, it is difficult to achieve a proper moving pattern in comparison with that in a tetrahedral field. The aim followed in this study is to simulate the optimal online route, planned to reduce the extra unhelpful distance and time during the performance of an operation. Throughout the present paper, using genetic algorithms and Matlab 2013 software, an optimal model of an unmanned farm machinery, in a rectangular farm, was simulated and compared with the previous traditional patterns in diagram form. The simulation results showed that the optimal model with avoidance of long turning routes is of the capacity to save approximately 51% in non-working distance and consequently 54% in wasted time as compared with the traditional traffic patterns.

Keywords: Genetic algorithm, Optimal pattern, Auto guidance, Non-working distance.

Technical, Economical and Nutritional Evaluation of Different Long Kernel Rice Milling Methods, Fars Province

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ABSTRACT

In this study, technical and economic performance of six different methods of long kernel rice milling (shamim variety) in Fars province and their effects on rice nutritional value was evaluated. In each method, power requirement, current and electrical energy consumption, system capacity, milling yield, rice breakage and cracking, kernel protein, ash and fat, amount of kernel calcium and iron were measured. Benefit to cost ratio was used to compare the treatments from the economic stand point. Results of technical evaluation showed that the best milling method for shamim variety was the method containing horizontal abrasive whitener and friction type whitener. This treatment also showed the lowest consumption of electrical energy, and the highest system capacity, and milling yield compared to other treatments. There was also a significant difference between the treatments from the view point of fat, protein and iron so that the highest amount of fat, protein, and iron was found in treatments 3, 6 and 5, respectively. Results of economical evaluation showed that treatment 6 was the most economic treatment compared to the other treatment, and treatments, 3,2,4,1, and 5 took the next places, respectively.

Key words : brown rice, milled rice, milling methods, rice nutritional.

An Experimental Investigation of the Dynamic Forces of Driven and Driving Off-road Tires Traversing Rigid Obstacles of Different Shapes

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ABSTRACT

The main objectives followed in this study are to determine the dynamic impact force imparted to a lugged tire due to a vertical load, travel speed of the tire, shape and height of the obstacle, as well as the slippage of the tire. The tests were carried out by means of a soil bin facility. Three shapes of triangular, trapezoidal and curved obstacles were employed in the study each at any of the three heights of 2, 3 and 4 cm while two wheel load levels of 1 and 2 kN were imparted to. The results prove that by increase in the vertical pre-load on the tire, the total dynamic impact force is increased. This increase could be attributed to the dependence of vertical inertial forces upon the dead load of the wheel axle. The results of analyses indicate a linear relationship between the tire travel speed and the total dynamic force. At unchanging shape and height of the obstacle, as the travel speed increases, the impact force imparted to the tire increases. Significant differences were observed between the dynamic forces exerted in the vertical direction vs. horizontal direction. In other words, increase in the height of the height of obstacle(s) results in the increase of the vertical component of tire velocity and then increase in the momentum of the tire leading to the enhancement of the vertical force.

Keywords: Tire, Obstacle, Single wheel tester, Tire-obstacle interaction.

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Discussion of Influence of Parboiling in Milling Rice Yield and Head Rice Yield

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ABSTRACT

The processing of rough rice into white includes the operations done on the crop from the drying the grading stage. Rice crack is considered as the most significant conversion loss in the rice growing regions of country. Parboiling along with gelatinizing rice starch and filling up of the cracks of rice leads to increased rice grain resistance and finally, the crack percentage significantly decreases with the conversion coefficient as well as the percentage of wholesome rice being increased as well. The use of microwave in parboiling operations has recently been taken into consideration by researchers. In the present study, the effect of four experimental factors namely: cultivar two levels (Shroodi and Hashemi), the soaking temperature at two levels of 60 and 70 C, two levels of microwave power (600 and 900 W) and finally the duration of heating within two levels of 2 and 4 mi) on conversion coefficient and the percentage of wholesome rice were examined. The results indicated that with increase in the soaking temperature, the conversion coefficient increases to a significant level. The conversion coefficient in Shroodi cultivar was significantly higher than that in Hashemi cultivar. With an increase in the microwave power, the percentage of sound and healthy rice increased significantly. The highest conversion coefficient and the uppermost percentage of unharmed rice in both cultivars were related to the factors of: soaking temperature of 60 C, power of 900 W and the heating duration of 2 min.

Keywords: Rice, Soaking, microwave, gelatinization

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Design and Development of an Intelligent Control System for Determination of Required Water Needed by Plant in Greenhouse Using Machine Vision (Case Study: *coleus*)

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ABSTRACT

The majority of volume in a plant cell is water; therefore changes in water content drastically affect the growth and metabolism of plants. To handle plants growth in water limited and drought stress conditions numerous mechanisms are considered to be used. In this study it was shown that the automated irrigation system could measure and determine the morphological and color parameters of plant as well as the plant wilting condition. Moreover, the required water for plants has been detected through automated irrigation system, and finally it performs necessary actions in order to improve plant condition. To check the system, in this study, an ornamental shrub with the scientific name of *Plectra thus scutellarioides* was chosen. According to statistical analysis, there were significant differences between the measured parameters of the wilting and fresh plants ($p < 0.05$). Intelligent control system recognized the required water for plants with precision, sensitivity, specificity and accuracy of 97%, 94%, 96% and 95%, respectively. This indicated that the ability of suggested system in order to measure and evaluate wilting plant conditions and control of required water for plant.

Keywords: Wilting, Drought stress, intelligent irrigation control, Greenhouse

Effects of Centrifugal Pretreatment on the Membrane Ultrafiltration of Coal-Derived Humic Alkaline Extracts

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ABSTRACT

In comparison with humates, fulvates play a more important role in biological and metabolic activities of plants due to their low molecular size and weight. This renders the efficient separation of fulvates from humic compounds to be of paramount significance. As a first case of study in this paper a membrane ultrafiltration system was employed to separate fulvates of low molecular weights (less than 5 kDa) from alkaline extracts of humic compounds derived from coal. In order to increase the membrane's separation efficiency, insoluble micro particles of humin were separated from soluble humate/fulvate alkaline solutions through centrifuging. Consequently, effects of centrifugal pre-treatment on separation efficiency was evaluated through permeate flux of fulvate and membrane fouling comprised of fouling resistances (R_T and R_p), percentage of membrane fouling (fouling%), predominant mechanisms of fouling and blocking index (i). The results revealed that centrifugal pre-treatment through separation of insoluble microparticles of humin and decreasing the average size of particles in the feed by 34%, causes an increase of permeate flux of fulvates by 65.14%. Moreover, through this process, membrane fouling decreased by 11%. In addition, centrifuging humic alkaline extracts, led to an intermediate blocking mechanism instead of formation of a cake layer. Finally, in order to analyze the phenomenon of membrane fouling, Scanning Electron Microscopy (SEM) micrographs were obtained which validated the theoretical results obtained earlier.

Keywords: Humic Alkaline Extract, Membrane, Ultrafiltration, Centrifuge, Microparticles, Humin, Fouling

Online Detection and Separation of Nodes and Internodes of Sugarcane Stalks using Machine Vision

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ABSTRACT

In recent years biomass materials has been used, as potential source of renewable energy, fuel, and etc. due to their local availability. Internodes contain glucan therefore; they are suitable for the alcohol production; while nodes with a high percentage of lignin and cellulose content are more suited for companies that need heat and energy. Thus, separation of different components of biomass would increase their value. In addition the uniformity of raw materials not only increases the performance of controlling and processing operations but also improves the working time of the processing equipment. The aim of this study is to separate nodes and internodes, automatically. To this end, the process of images was conducted based on the knowing the fact that sudden drop of gray level values, along the main axis of the sugarcane stalks, could be the indication of node. Concord to obtained result, machine vision system accuracy was more than 98%.

Keywords: Separation, Nodes, Internodes, Image processing

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A Study of the Effect of Cutting Parameters on Modeling the Carrot thin-Layer Drying

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ABSTRACT

Drying process of fruits and vegetables depends on temperature, air flow as well as the internal tissues of the plant. Cutting carrot at different directions causes the slice be cut at different cell tissue directions that affect the drying kinetics. In the present research the effects of three blade (flat, wavy, serrate edge), three directions of slicing (horizontal, diagonal and vertical) and thicknesses of two sizes (3 and 6 mm) on modeling of drying have been studied. The experiments were done with 3 replicates while the responses fitted a number of 7 models. The results revealed that the logarithmic model is the most appropriate one for all the treatments with $R^2 \geq 0.98$, $RMSE \leq 0.04$ and $SSE \leq 0.019$. Also, it was found that the cutting variable does not affect the drying model. Moreover, the highest of the moisture diffusion coefficient of carrot was obtained about 5.07 m²/s for slice thickness of 6mm with wavy blade at diagonal direction and 2.55 m²/s for slice thickness of 3mm with wavy blade at a horizontal direction. These conditions seem to be appropriate to be suggested for the drying of carrot slices .

Keywords: Carrot, Drying, Modeling, moisture diffusivity, slicing .

Non-destructive Detection of Codling Moth Damage in Apple Fruit Using Hyperspectral Imaging Method

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Abstract

Demand for high quality products has been on the rise within recent years. Strict standards have also been set for their safety. Thus, in order to enhance the export of fruits, there is a dire need to use improved post-harvest technologies for quick, effective and accurate determination of the products' quality and safe being. Throughout the present study, Hyperspectral Imaging method of inspection within the range of 400-1000nm has been applied to detect the infested apples from the non- infested normal ones. Following the preparation of the infested apple samples as according to standard methods, they were transferred to the lab. The desired images were taken under controlled conditions. Subsequently the average relative reflectance was taken from the sample's region of interest and then pre-processed. Finally the average relative reflectance data were classified using different machine learning methods including Discriminant Analysis (DA), K-Nearest Neighbor (KNN) and Decision Tree (DT) techniques. Results revealed that classification of infested samples from normal ones was possible with the classification rates of 96% and 94% for normal and infested apples, respectively. The highest classification rate was achieved for DA method. Also, the optimum wavelengths were extracted from the spectrum to develop the Multispectral Imaging system. The results finally indicate the high performance of Hyperspectral Imaging Method as a proper non-destructive detection method of infested samples as for application in apple grading machines.

Keywords: Hyperspectral Imaging, Discriminant Analysis, K-nearest Neighbor, Decision tree, Apple grading F

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Effects of Nanoclay and Peppermint Essence Containing Carboxymethyl Cellulose Coating on the Characteristics of Stored Eggs

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ABSTRACT

In recent years the use of polysaccharides as biodegradable coatings for edibles has become of considerable importance. In the present study, the effects of carboxymethyl cellulose-based coating containing clay and peppermint oil on such quality characteristics as Haugh and yolk index, egg weight, as well as its pH during cold storage vs. at room temperature conditions were investigated. The coating's formulation, using a central composite design, based on Tensile strength, Elasticity and Water vapor permeability of the coatings were optimized, so that the optimal sample consisted of clay 3.48 percent plus essential oil of 1.35 percent. Then, using a completely randomized design comprised of eggs uncoated, coated with carboxymethyl cellulose vs. optimal coatings were compared. The evaluation results of the qualitative characteristics indicated significant differences among the treatments as compared with the control. The essence significantly affected the quality characteristics of eggs during their storage. In general, all the qualitative features of optimally coated samples suffered from less deterioration during their cold storage, and as well, at room temperature. As a result of using this type of coverage along with control of storage temperatures, the shelf life of eggs will be increased to a considerable extent.

Keywords: Egg, Peppermint, Antimicrobial coatings, Haugh index

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Measurement of Paddy Mass Flow using Capacitive Sensor and Its Modeling through Multiple Regression, ANN, and ANFIS Models

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ABSTRACT

Measurement of the mass flow of agricultural products by use of capacitive sensors as an inexpensive rapid method has recently been developed. But the predicted mass flow (due to the dependence of the sensor response upon various factors, as well as the interaction complexity of these factors) is difficult. So, throughout the present study the potential of Artificial Neural Network (ANN), Adaptive Neuro-Fuzzy Inference System (ANFIS) and Multiple Regression (MR) techniques to predict paddy mass flow by use of capacitive sensors was scrutinized. Frequency, Moisture content and output voltage were employed as input variables while mass flow considered as output in the developed models. Results revealed that ANN presented the most appropriate correlation between predicted and actual values ($R^2 = 0.927$); ANFIS resulted in the correlation between predicted and actual values, with the correlation coefficient of R^2 equal to 0.909. The results finally indicate that ANN and ANFIS techniques can potentially be used to predict mass flow as regards agricultural products.

Keywords: Capacitive sensor, Mass flow, ANN, MR, ANFIS

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An investigation of Growth Kinetics and Survival of *Lactobacillus paracasei* and *Lactobacillus delbrueckii* in Barley and Malt Substrates, and the Effect of These Microorganisms on the Media's Antioxidant Properties

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ABSTRACT

Throughout the present study, the potentials of barley, barley-malt, and malt media regarding the viability and growth of two species of *Lactobacillus* (*Lactobacillus paracasei*, *Lactobacillus delbrueckii*) as for the production of functional beverage were evaluated. The effects of fermentation (on the media's antioxidant activities plus total phenolics content) were determined and compared with those observed in the non-fermented media state. Results showed that the selected bacteria could grow in all the three media so that their media's pH values fell to around 4.25 during the first 10 hours of fermentation. The highest microbial growth (9.7 log CFU/ml) was observed in malt medium. The phenolic content and antioxidant activities of the media increased during fermentation with *L. paracasei*-fermented malt medium presenting the highest content of phenolics (83.96 mg of gallic acid equivalents per 100 ml) and antiradical activity (IC₅₀ = 0.26 ml). On the other hand, the highest cell viability (1.2×10⁶ CFU/ml) was obtained for the malt-based beverages fermented with *L. delbrueckii*.

Keywords: Barley, Malt, Fermentation, *Lactobacillus*, Antioxidant activity

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Evaluation and Selection of the Most Important Parameters in the Distribution Chain Agility Combine Owners Cooperative Fars province

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ABSTRACT

Supply chain is containing some units to produce materials and services, starting from suppliers and ending with customers, with the aim of reducing costs and increasing service level. Combine owners cooperative has an important role in reducing pre-harvest losses caused by delay. The sensitivity of agricultural productions to unstable environmental has increased the necessity of cooperatives appropriate reactions. Requirement of effective respond is reaching agility. In this research agility criteria identified in previous studies. A questionnaire was prepared and completed in order to identify the most important factor of agility cooperative distribution chain. The important agility criteria were identified and rated by using of SAW method. afterward calculating A*, three parameters, sensitive and responsive to the market and customers, speed of work and introduction of a new product with value of 0.08620 were in first place and accurate programming, cost reduction, uniformity of tasks and process, using IT, customer satisfaction, flexibility, service quality and development of staff skills were in second to ninth place, their values are respectively 0.082328, 0.077243, 0.074230, 0.073355, 0.071509, 0.069464, 0.065749 and 0.063601.

Keywords: Supply chain, Agility model, Cost reduction, Service level increase

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Effect of Different Drying Conditions on Characteristics of Powder Density and Adsorption of Dried Coriander

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ABSTRACT

Adsorption is one of the very important properties of dried food. Higher the crop ability to adsorption water resulted in better conditions of drying. Therefore, the conditions in which the crop adsorbs more water are the best. The packed and loosed densities are the most important measured parameters for powders. This subject is important for industrial transportation, storage and packaging. In this research, effects of temperatures (35, 45 and 55°C), drying air rate (0.008, 0.016 and 0.024 m³ s⁻¹) and with or without using heat pump in a solar dryer were investigated on adsorption percent, packed mass density and loosed mass density in a factorial test based on completely randomized design at three replications. Also, the results were compared with the cabinet and traditional drying methods. Results indicated that temperature, air rate, using heat pump and the interactions had significant effect ($p < 0.01$) on adsorption percent of dried coriander samples and powder density. Also, the dried samples in heat-pump assisted solar dryer had better quality in comparison with the traditional and cabinet dryers. The temperature of 55 °C and air rate of 0.024 m³ s⁻¹ resulted in better quality of the crop and it can be recommended as the best treatments for dried coriander.

Keywords: Drying, Coriander, Heat pump, Adsorption, Mass density

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