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Gillnet Fishing Systems

Effect of Operating Parameters

Highlights

Mechanical Oil Expression

Development of Yoghurt Incubator

Discovering Thoughts, Inventing Future

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Contents of the Issue

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Development of Yoghurt Incubator for Small-Scale Production using PIC16F877A Microcontroller

By Rogelio B. Paguntalan, Vinyl Ho Oquiño & S. China Venkateswarlu
Adama Science and Technology University, Ethiopia

Abstract- The largest population of livestock in Africa is found in Ethiopia. The country produces about 3.2 billion litters of milk annually from 10 million milking cows. Yogurt processing is one of the ways to prolong the shelf life of milk. Thus a low-cost yogurt incubator suitable for small scale production which was equipped with a microcontroller was developed. The main components of the incubator include the microcontroller and temperature sensor, alarm circuit, power supply circuit, and the embedded program. The incubation chamber was made of a locally available ½ inch ordinary plywood. The components were assembled and installed after the incubation chamber was constructed. The operating temperature of the incubator was set at 42°C (±1°C). The incubator was tested using one litter of pasteurized cow's milk inoculated with *Lactobacillus* bacteria. The inoculated milk was placed in bottles and incubated for 24 hours. Results of the sensory test showed that the incubator produced a good quality yogurt comparable to that being sold in the area.

Keywords: *microcontroller, incubator, yoghurt, temperature sensor, relay driver, relay, heater and buzzer.*

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Development of Yoghurt Incubator for Small-Scale Production using PIC16F877A Microcontroller

Rogelio B. Paguntalan [α], Vinyl Ho Oquiño [σ] & S.China Venkateswarlu [ρ]

Abstract- The largest population of livestock in Africa is found in Ethiopia. The country produces about 3.2 billion litters of milk annually from 10 million milking cows. Yogurt processing is one of the ways to prolong the shelf life of milk. Thus a low-cost yogurt incubator suitable for small scale production which was equipped with a microcontroller was developed. The main components of the incubator include the microcontroller and temperature sensor, alarm circuit, power supply circuit, and the embedded program. The incubation chamber was made of a locally available ½ inch ordinary plywood. The components were assembled and installed after the incubation chamber was constructed. The operating temperature of the incubator was set at 42ºC (±1ºC). The incubator was tested using one litter of pasteurized cow's milk inoculated with *Lactobacillus* bacteria. The inoculated milk was placed in bottles and incubated for 24 hours. Results of the sensory test showed that the incubator produced a good quality yogurt comparable to that being sold in the area.

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I. Introduction

In 2010, it was reported that Ethiopia had the largest population of livestock in Africa consisting of 49.2 million cattle, 46.8 million sheep and goats, and 9 million pack animals. It also produces approximately 3.2 billion litters of milk per year from 10 million milking cows [1]. Eighty-three percent of all milk produced in Ethiopia comes from cattle and the remainder comes from goats and camels [2].The shortage of crossbreed dairy cows, lack of capital by dairy producers, inadequate animal feed resources, unimproved animal husbandry systems, inefficient and inadequate milk processing materials and methods, low milk production and supply to milk processing centres and poor marketing and market information systems are some of the main reasons for the low productivity of livestock production system in Ethiopia [3].

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Yogurt processing is one of the ways to prolong the shelf life milk. At present, rural farmers in Ethiopia process yogurt using the traditional method which takes about 2 to 3 days in places where temperature is favourable. In highland areas of Ethiopia, production of yogurt is very limited owing to cold temperature. This problem can be addressed with the availability of low-cost yogurt incubator that can be made using locally available materials and technology. The incubator shortens the incubation time of yogurt from 2-3 days to about 12 to 24 hours and thus help milk producers in increasing the yogurt production in the area.

This research was aimed to develop an incubator, equipped with a temperature microcontroller for small-scale yogurt production in Ethiopia. The output of the research is expected to benefit small food entrepreneurs and local dairy farmers engaged in yogurt processing.

II. Hardware and Software Components of the Yogurt Incubator

The yogurth incubator consist of five main component namely, temperature sensor, microcontroller, relay and relay driver, heater and buzzer. Figure 1 shows the simplified block diagram of the yogurth incubator. The microcontroller is the heart of the system. It controls the buzzer and heater based on the embedded program stored in it. The temperature sensor detects the temperature inside the incubator and convert the temperature into analog voltage and send it to the microcontroller.

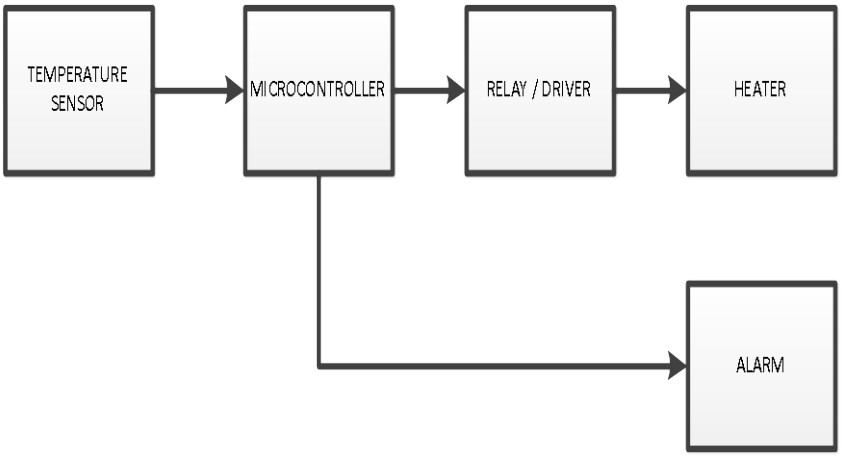

Figure 1 : The Hardware Block Diagram of Yogurth Incubator

a) The Microcontroller and Temperature Sensor

Figure 2 shows the schematic circuit diagram of the configuration of the PIC16F877A microcontroller. It uses a 4 MHz crystal oscillator as the clock oscillator with 22 pF ceramic capacitor as filter connected to the crystal oscillator. The connection of the oscillator and the filter capacitor is based on the microcontroller manufacturer configuration standard. From the PIC16F877A datasheet oscillator pin is directly connected with pin 13 and 14 as shown in Figure 2. The LM35 temperature sensor was used to measure the temperature inside the yogurt incubator. It was used to maintain the average temperature of 42 (±1) degrees centigrade. The output terminal of the LM35 was connected to pin 2 of the microcontroller. This pin is the analog input of the said microcontroller. The LM35 sensor converts the temperature to analog voltage. The converted analog voltage is sent to the analog input of the microcontroller for checking the desired cut-off voltage to turn on or off the heater circuit.

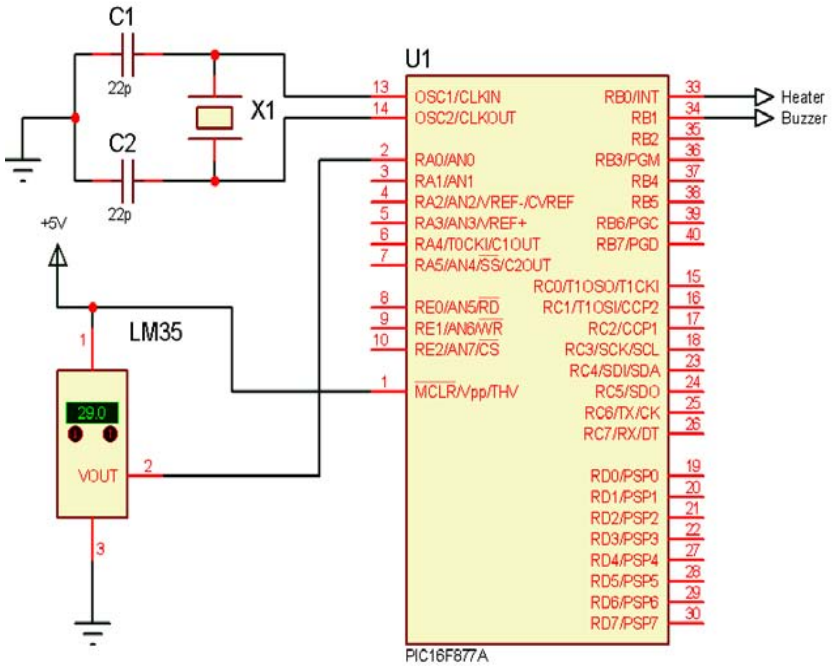

Figure 2 : The Microcontroller and Temperature Sensor Circuit

b) The Relay driver, Relay and Heater

Figure 3 shows the relay driver circuit connected to the relay to control the heater. A 100 watt 220 Vac incandescent bulb was used as the heater of the incubator. The 9013 general purpose NPN transistor was used in the circuit. From the datasheet it has a collector current of 1000 mA. The relay coil operates at 12 VDC supply.

$$Ib = \frac{Ic}{\beta}$$

Where:
Ic = Relay coil current

$$\text{Relay Coil Current} = \frac{\text{Coil Voltage}}{\text{Coil Resistance}}$$

Based on the resistance test, the coil resistance was found out to be 100 ohms.

Thus; Relay coil current is equal to 120 m. and Ib = 1.2 mA

$$R1 = \frac{5 - 0.7}{1.2\ mA}$$

$$R1 = 3.6\ K\Omega$$

$$Current\ of\ the\ bulb\ = \frac{Watt}{Volt}$$

Thus;

Current of the bulb is approximately 455 mA

Since the relay coil current is 120 mA,a 9013 general purpose NPN transistor can be used. The D1 as flywheel diode that protects the transistor uses 1N4007 rectifier diode. From the datasheet, it has a maximum current of 1000 mA and the peak inverse voltage of 600 volts. A 5 ampere relay contactor was used in the circuit.

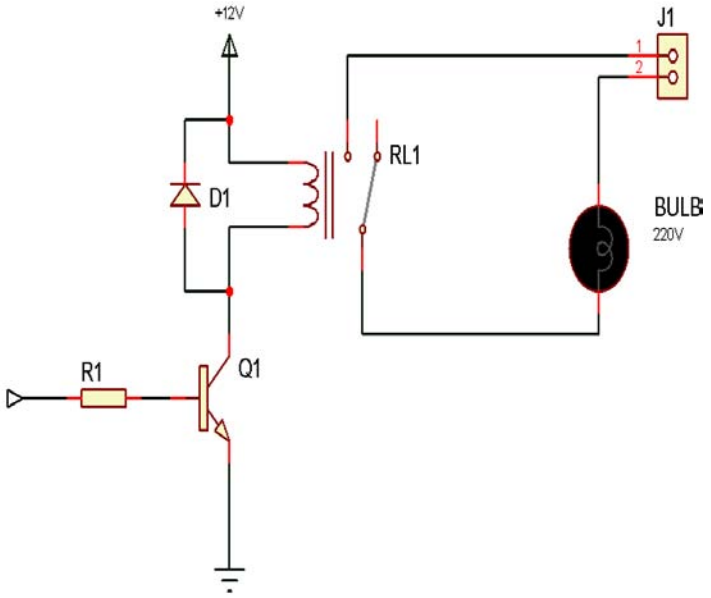

Figure 3 : The Relay Driver and Relay connected to Heater

c) The Alarm Circuit

A small buzzer with a 5 volts DC supply was used in the project as shown in Figure 4. The buzzer was used to produce a sound to alarm the user that the yogurt is ready to be removed from the incubator. This this was done to prevent excessive fermentation of yogurt. The 9013 general purpose transistor was also used in the circuit to drive the buzzer. The buzzer operates at a maximum current of 100 mA. The component used in the circuit is the same as the relay driver since less amount of current is required by the buzzer.

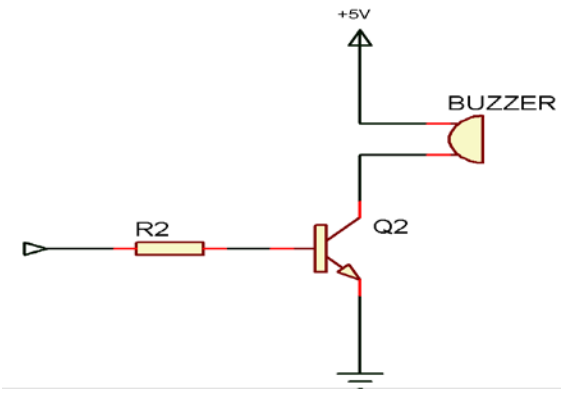

Figure 4 : The Alarm Circuit

d) The Power Supply Circuit

The power supply circuit is shown in Figure 5. The 220 Vac supply coming from the convenience outlet was converted into 12 and 5 volts DC. These voltages were required for the different circuits to operate properly. The 12 volts DC was used by the relay while the 5 volts was used by the microcontroller and the alarm circuit. The stepdown transformer was connected directly to the 220Vac power supply. The transformer used in this project was 750 mA 12 volt center tap.

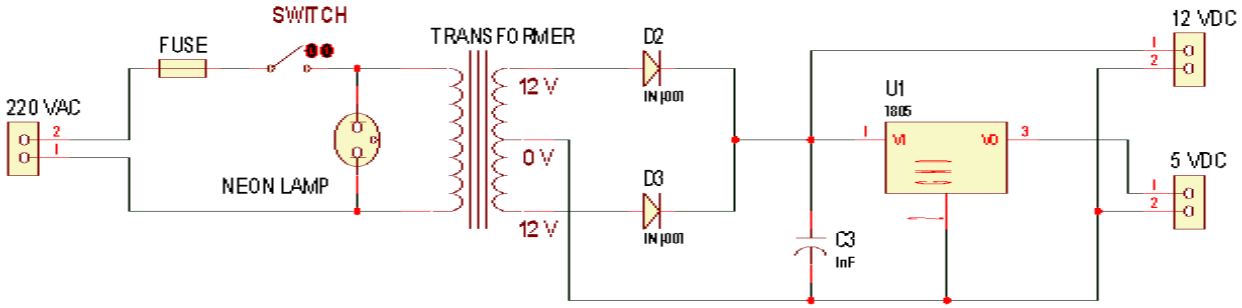

Figure 5 : The Power Supply Circuit

The power supply uses a full wave rectifier circuit. The LM7805 voltage regulator was used to maintain a 5 volt DC supply to the microcontroller and alarm circuit. Based from the datasheet the LM7805 regulator has a maximum current of 1000 mA. Since the total load current required for 5 volts DC supply was approximately 150 mA, LM7805 was used. The total current required for the whole hardware was approximately 300 mA. A 0.5A fuse was connected to the primary input of the transformer. The neon lamp 220Vac was used as power indicator for the power supply circuit.

e) The Embedded Program

Figure 6 shows the flowchart diagram of the embedded program used in the microcontroller. The program was written using MikroC v.8.0. The first step in writing the program was to configure the different ports of the microcontroller. Port RA0 on the microcontroller was configured as analog input that will read the output of the LM35 temperature sensor. Ports RB0 and RB1 were configured as outputs of the microcontroller that will be used to turn on and off the heater and alarm circuit, respectively. After the configuration on all the ports the heater will be turned on automatically. And the temperature inside the incubator will be measured using the LM35. The analog output of this sensor will be read and converted into digital signal using the ADC module of the microcontroller. If the temperature is less than 42 degrees Celsius the heater will still be on. And if the temperature is equal or greater than 42 degrees Celsius the heater will be off. The timer in the program will continue for eight hours. If the timer reaches 8 hours the alarm will be turned on to signify that the yogurt is ready to be remove from the incubator.

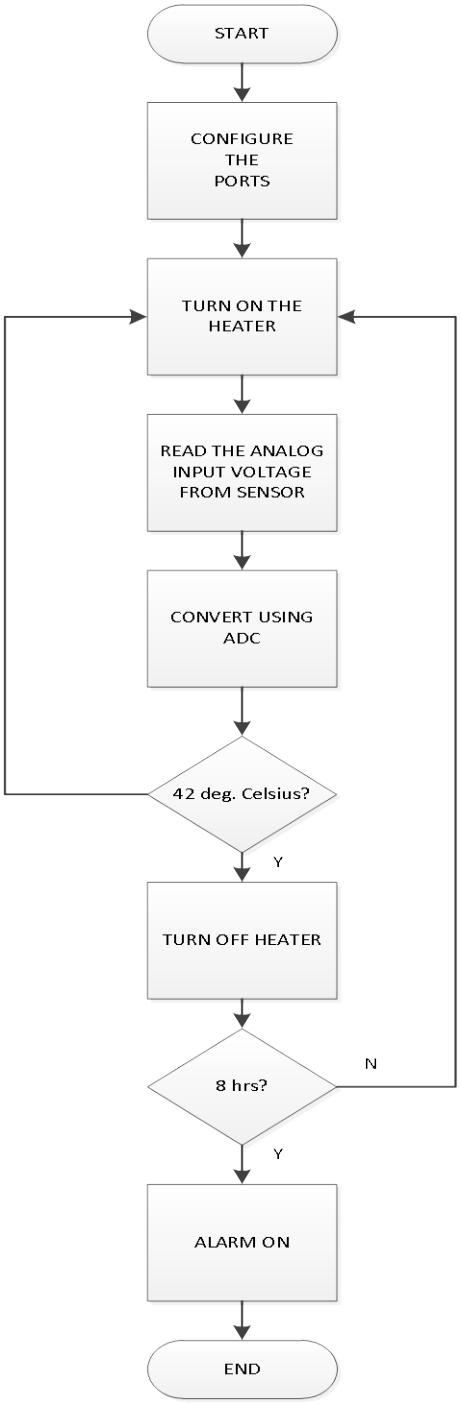

Figure 6 : The Flowchart Diagram of the Embedded Program

III. Implementation Results

The final implemented output is discussed in this section. The yogurt incubator has two main components, the hardware and the embedded program. Figure 7 shows the hardware controller component with the power supply. The entire components were installed using the PCB.

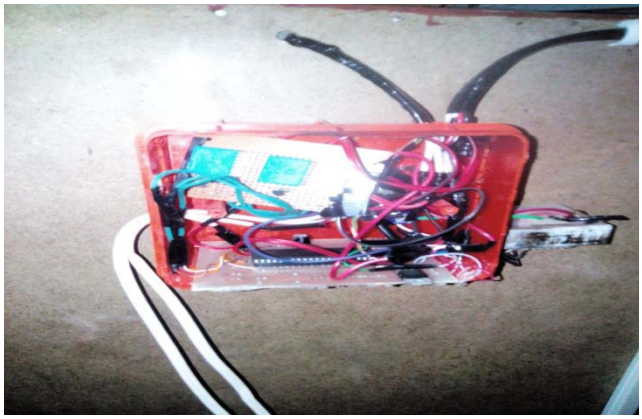

Figure 7 : The Hardware Controller Component

The different hardware circuits receivepower supply directly from the convience outlet via the transformer and regulator circuit.

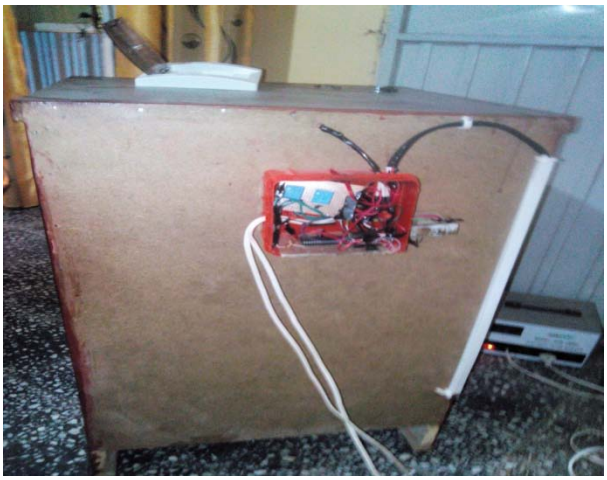

Figure 8 : The Hardware Controller Installation

The hardware controller was installed at the back of the yogurt incubator as shown in Figure 8. This was done to facilitate maintenance of the controller.

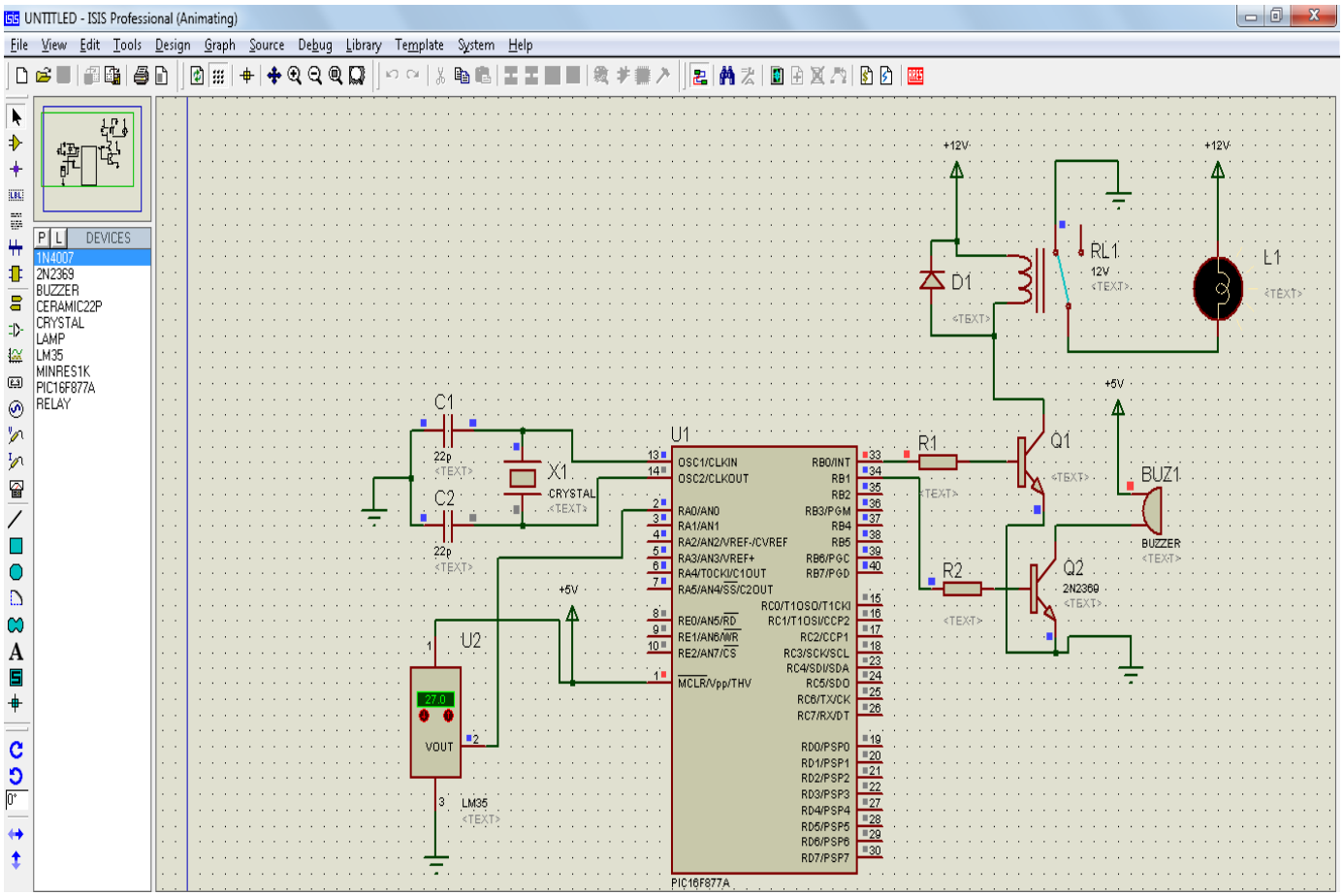

Figure 9 : The Hardware Controller Simulation in Proteus

The result of the hardware controller simulation done in Proteus is shown in Figure 9. The simulation of the embedded program and the simulation run was based on the operatingtemperature requirement of the yogurt incubator. When the temperature is under 42 degrees celsius the relay is turned on and when it is equal or more than 42 degrees celsius the relay is turned off. When the timer reaches 28800 seconds which is equal to 8 hours, the alarm is turned on.

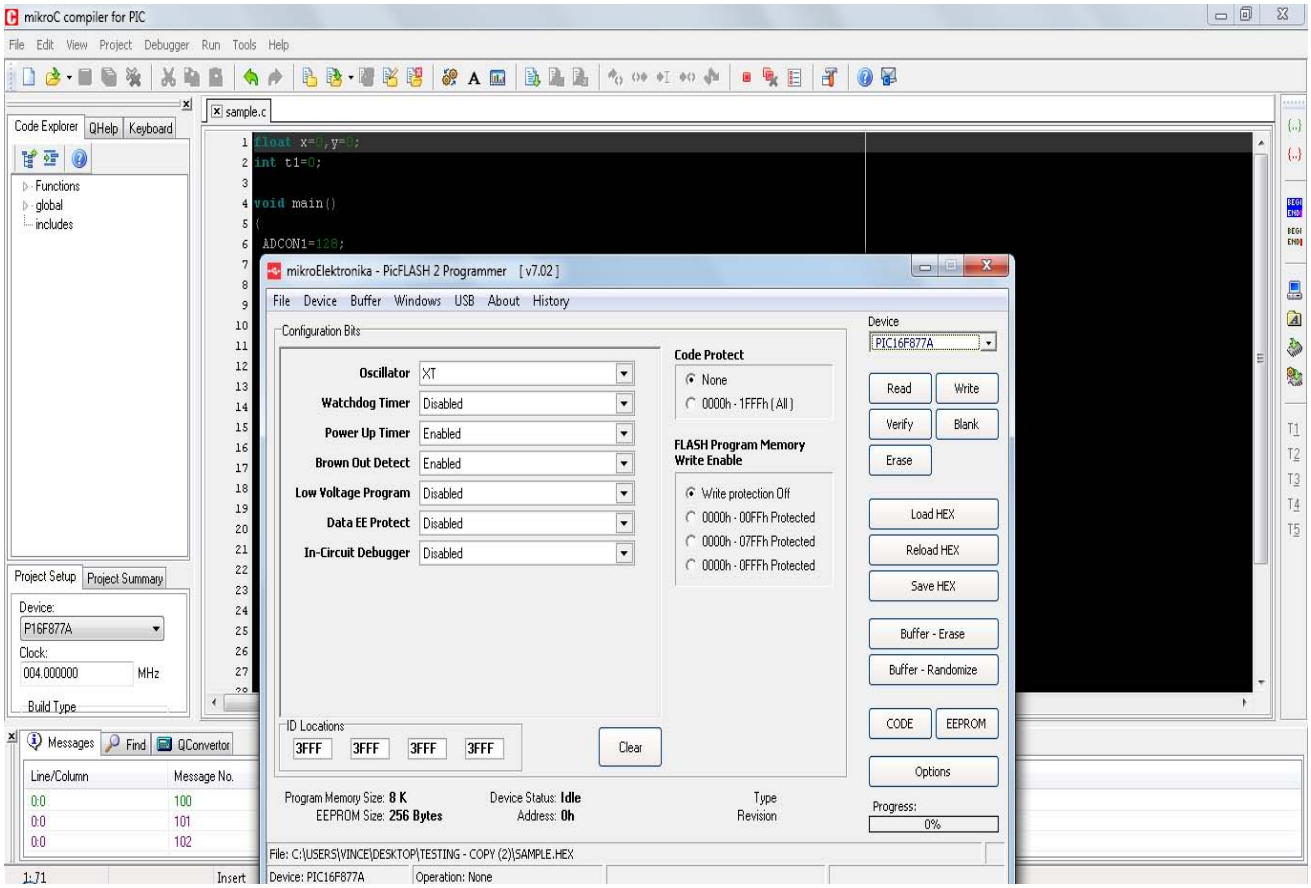

Figure 10 : The Compilation of the Embedded Program using MikroC

The embedded program was written and compiled using MikroC as shown in Figure 10. The hardware needs a hex file that will be loaded to the microcontroller. By using MikroC, the hex file is generated and made ready for loading into the microcontroller.

Figure 11 shows the prototype yogurt incubator.All the hardware controllers were connected to the incubation box. The front side consists of a small rectangular glass mounted on the door of the incubator. The incubator can hold about 100 bottles per batch containing 150ml each.

Figure 11 : The Yogurth Incubator

The samples of yogurt produced using the incubatorare shown in Figure 12. Results of the prelimenary sensory test showed that the taste of yogurt produced was comparableto that of the commercial yogurt being sold in the area.

Figure 12 : Samples of yogurt produced using the incubator

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Effect of Operating Parameters on Mechanical Oil Expression from African Oil Bean Seed

By Aremu, Ademola K. & Ogunlade Clement A.
University of Ibadan, Nigeria

Abstract- African oil bean seed is an under-utilized leguminous crop planted mainly as shade tree and condiment. The seed contains considerable amount of oil which if extracted will serve as alternative vegetable oil and also boost the economic status of the crop. The main objective of this study was to study the effect of operating parameters on the mechanical oil expression. Operating parameters considered include heating temperature (50, 70, 90, 110 and 130^{0}C), heating time (5, 10, 15, 20 and 25 minutes) and moisture content (8, 10 and 12 % dry basis).A total of 75 experiments were carried out and the maximum oil yield expressed from 500g of seed was 52.3% which translates to an expression efficiency of 86.8% (achieved at seed moisture content 10%db, 15 min heating duration and 90^{0}C heating temperature), minimum oil yield for the same quantity of seed was 25.6% (42.4% expression efficiency, achieved at 50^{0}C heating temperature, 12% moisture content dry basis and 5 minutes heating time) while the mean oil yield was 36.2% (59.9% expression efficiency of the raw material, at 130^{0}C heating temperature, 20 minutes heating time and 12% moisture content dry basis). It was discovered that operating parameters had significant effect on the yield oil. Regression model was developed to predict the oil yield at known operating parameters.

Keywords: *moisture content, roasting time, roasting temperature, oil yield, expression efficiency, regression model.*

GJSFR-D Classification : *FOR Code: 079999*

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Keywords: moisture content, roasting time, roasting temperature, oil yield, expression efficiency, regression model.

I. Introduction

Oil obtained from seeds and nuts are of paramount importance to mankind as food either for baking or transfer of heat during frying. Oils are a source of calories and of fast soluble vitamins. Moreover, oil also have a number of non-food uses with numerous applications in paint industries as lubricants and also as ingredients in cosmetics. Oil extracted from oleaginous plants are termed vegetable oil. Obi (2013) reported that the vegetable oil market in Nigeria has been flooded with adulterated and different types of vegetable oil due to existing huge market for the product, these oils include health hazard products which cause heart problems, obesity, hypertension and cancer among others.It's quite unfortunate that to most people, there is no difference between vegetable oil productssince they all almost look alike and can perform the same function, they believe all are good for consumption (Obi, 2013). Oil seed plants are good preventive sources against numerous ailments including arthritis, rheumatism, sexually transmitted diseases, hypertension, boils and several other life-threatening diseases (Eilert *et al*., 1981). There is a steady rise for the demand of vegetable oil in most developing countries for nutritional, pharmaceutical and industrial importance;this oil can be obtained from various agricultural products especially oleaginous crops. Vegetable oil has been extracted fromcotton, sesame, groundnut, melon, palm kernel, castor oil, soybean, corn, pumpkin, moringa, sunflower, rapeseed, roselle among other crops however, African oil bean (*Penthaclethra macrophylla* Benth) seeds remains undertilized as it is been used only as a food source. It isa leguminous tree of the family leguminosae and sub-family mimosoideae cultivated in Nigeria since 1937 (Ladipo, 1984; Ladipo and Boland, 1995), its seed contains oil which can serve as an additional vegetable oil if extracted since no oil from a single source can be suitable for all purposes (Ramadan and Morsel, 2003). The seed is one of the most widely eaten fermented foods in the Eastern part of Nigeria (Abiodun and Sanni, 2006; Aremu and Iroakazi, 2011; Aremu *et al.,* 2014a, Aremu *et al.,* 2014b); it is very rich in vitamin and minerals thus making its demand for both local consumption and export very high (Enujiugha, 2003) and the condiment is taken as a delicacy or added to soups and sauces as flavouring agents. Aremu and Iroakazi (2011) reported that the tree provides economic products such as food, fodder and fuel, it protects the soil against erosion by wind through its canopy and root system and recycles plant nutrient from the deeper soil horizons to the top soil in the form of litter fall and decaying organic plant residues. Allinor and Oze (2011) evaluated the nutritive values of *Penthaclethra macrophylla* Benth and reported that it contains 11.87% moisture content, 2.95% ash content, 46.95% crude fat content, 20.95 crude fibre content, 14.79% carbohydrate content and 2344.56 kJ available energy. Moreover, the mineral composition of the seeds shows that they are rich in iron value (140.97 mg/100g) with potassium being the most abundant mineral, and they possess a high Ca/P ratio which indicates that the seeds are good source of food (Enujiugba and Agbede, 2000), Oyeleke *et al.* (2014) reported that the seeds are rich in protein, oil, energy and have abundance of mineral salts like sodium, potassium, magnessium, calcium, phosphorus and lower concentrations of iron, zinc, copper and lead; this denotes that the seed has a potential for dietary

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improvement in food industries. African oil bean seeds have been found to cure numerable diseases; notable among which are: heart disease, diarrhea, epilepsy, malnutrition, stomach disorder, iron deficiency, eye problem and insomnia; consumption of the seeds will reduce the risk of cancer and tobacco-related diseases (Bonnie, 2010). The common uses of African oil bean seeds in West Africa is presented in Table 1:

Table 1 : Common Uses of *Pentaclethramacrophylla* in West Africa

Uses	Parts of plant	Countries
Food	Seed	Nigeria/ Ghana
Salt substitute	Pod ashes	Ghana
Edible oils	Seeds	Nigeria, Ghana, Togo, Cameroon
Fences and palings	Wood	Nigeria, Ghana, Togo, Cameroon, Cote d'ivoire
Charcoal	Wood	
Caroling bowls, etc	Wood	Nigeria, Ghana
Sees craft (beadings)	Seed	Nigeria, Ghana
Dye (mordant)	Pod ashes	Nigeria
Mild poison	Bark and seed	Ghana
Medicine (Convulsion)	Pod	Ghana
Medicine(convulsion)	Crushed seed	Cameroon
Medicine (convulsion)	Burnt leaf	Ghana, Nigeria
Medicine (diarrhea)	Leaf / steam bark	Ghana
Medicine (itch)	Bark as liniment	Ghana
Medicine (lactogenicity)	Bark decoction	Ghana
Medicine (wound treatment)	Bark as lotion	Ghana
Ornamental	Whole tree	Ghana, Nigeria

Source: Abbiw (1990).

There are gaps in the vegetable oil market as the present production level in Nigeria cannot meet the demand of Nigerians (Obi, 2013), African oil bean seeds can be utilized to produce inexpensive and readily available oil suitable for food, pharmaceutical and industrial applications by separation of oil from the seed. The process employed in oil separtion of seeds has direct effect on the quality and quantity of oil obtained.Ibrahim and Onwualu (2005) stated that oil extraction from agricultural products can be carried out in two ways; traditional and improved methods (mechanical or chemical). The chemical method of extraction requires the use of organic solvents while the mechanical method requires application of varying degrees of pressure to already pre-treated oil bearing products using devices like screw or hydraulic press (Gunstone and Norris, 1983) or oil expellers and improved ghanis (UNIFEM, 1993). The most widely used method of oil extraction is the pressing method in which the raw material bearing the oil are compressed and squeezed in a perforated chamber. Ojomo *et al.* (2011) and Olaniyan*et al.* (2010) reported that the pressing method is effective in extracting and recovering oil from oil-bearing agricultural materials. It generally consists of the screw conveying system, cylindrical barrel and the die (Fellows, 2000). The yield and quality of oil extracted using mechanical expression method depends on crop, operating and machine parameters like moisture content, heating time, pressure, operating temperature, seed size, speed of operation etc (Adekola, 1991; Ibrahim and Onwualu, 2005). Thus, the main objective of this study was to determine the effect of moisture content, heating time and roasting temperature on the yield and expression efficiency of oil from African oil bean seed using mechanical expression method.

II. Materials and Methods

Materials: The main materials used for this research include: African oil bean seeds (Plate 1a and b), Electronic Digital Compact Scale (SF 400A, 5000g x 0.1g), electric oven, mechanical oil expeller (Plate 2).

Sample Collection and Preparation: Fresh seeds of African Oil Bean were procured from Ojoo market, Akinyele Local Government, Ibadan, Oyo State. The seeds were visually inspected to discard the defective ones, they were decorticated by removing the hulls and the beans were kept in air-tight polythene bags. Fresh un-dehulled and dehulled African oil bean seedsamples are presented in Plate 1 while Plate 2 shows the oil expeller used for the experiment.

Plate 1 : a- Undehulled, b- Dehulled African Oil Bean Seeds

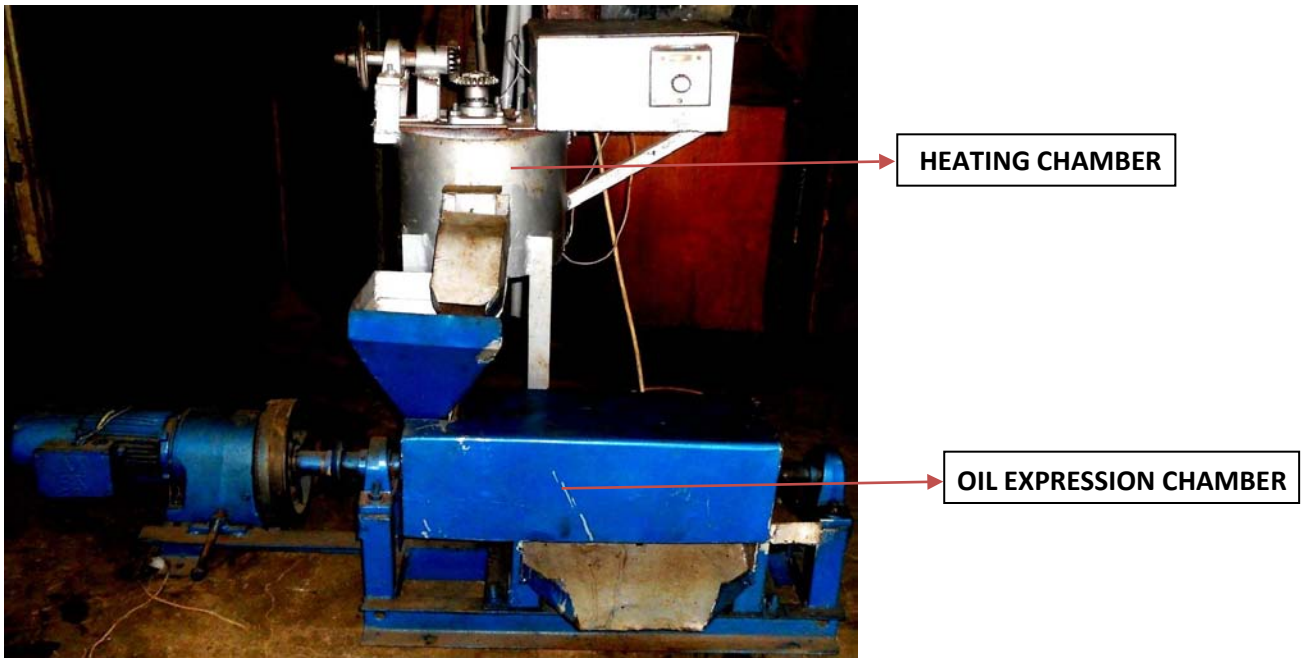


Plate 2 : The Oil Expeller

Moisture Content Determination and Adjustments: The initial moisture content of the seeds was determined using ASAE (1998) method for determining moisture content of oil seed crops by oven drying the seeds at 105^{0}C to constant weight. Initial moisture content of the seeds was found to be 10% dry basis. However, they were conditioned to desired levels by dehydration and rehydration; mass of water added to obtain a predetermined moisture content level during rehydration was obtained using Equation 1 (Bisht, 1986):

$$Q = \frac{A(b-a)}{(100-b)} \quad \ldots 1$$

Where: *Q* is the mass of water added (g), *A* is the initial mass of samples, *a* is the initial moisture content of samples and *b* is the final (desired) moisture content of samples.

Evaluations and Data Analysis: The oil yield and expression efficiency was determined in accordance with Phillipines Agricultural Engineering Standard PAES 230 and 231 for oil expellers. The weight of oil expressed and input materials were measured; the following relationships were used accordingly to obtain the oil yield and expression efficiency (Equations 2 and 3):

$$Oy = \frac{Wo}{Wi} x100\% \quad \ldots 2$$

$$E_e = \frac{w_o}{X.w_i}\, x\, 100\% \quad \ldots 3$$

Where: *Oy* is the oil yield (%),*Wo* is the weight of oil collected (g), *Wi* is the weight of seeds fed into the hopper (g), *Ee* is the extraction efficiency (%), *X* is the oil content of African oil bean seeds [0.604].

Heating/roasting temperature and time are interactive factors that influence the yield of oil from African oil bean seeds. The seeds are roasted at five different temperature and time intervals before the extraction of oil using an automated heating chamber in order to determine the effect of heat treatment on the oil yield and expression efficiency.

The number of experiments for the determination of effect of moisture content and seed dimension on oil yield and expression efficiency was determined using the Equation 4 (Harper and Wanninger, 1969).

$$N = (L_1)(L_2)(L_3) \dots \dots \dots \dots \dots \dots \dots \dots (L_m)(5x5x3)$$

Where: N is the number of experiment (75), L is the levels of independent variables and m is the number of independent variables.

An equal mass of seed (500g) was fed into the hopper for the 75 total number of experiments to determine the effect of operating parameters. Three moisture contents were considered for the seeds (8, 10 and 12 %db) and the seeds were heated at 50, 70, 90, 110 and 130 ^{0}C at varying durations 5, 10, 15, 20 and 25 minutes. Historical Data Design of Design Expert Software 6.0.6 was used for the analysis of result and generation of regression model.

III. Results and Discussions

The percentage oil content of African oil bean seeds used for this experiment as determined by soxhlet method was 60.4%. Maximum oil yield expressed from the 500g of seed was 52.3% which translates to an expression efficiency of 86.8%, this was achieved at seed moisture content 10%db, 15 min heating duration and 90^{0}C heating temperature. Minimum oil yield for the same quantity of seed was 25.6% (42.4% expression efficiency, achieved at 50^{0}C heating temperature, 12% moisture content dry basis and 5 minutes heating time). The mean oil yield was 36.2% (59.9% expression efficiency of the raw material, at 130^{0}C heating temperature, 20 minutes heating time and 12% moisture content dry basis).Sodiq (2012) reported 60.6% oil yield for the same seeds using solvent extraction method and microwave heating and Enujiugha and Ayodele (2003) reported that African oil bean seed contains more than 52% oil in its cotyledon and proper processing of the seeds has the possibility of increasing the oil content from around 52 to more than 60.1 percent (Enujiugha and Akanbi, 2005) however, the oil yield obtained are in the same range with some other oil seeds and nuts reported in literature including (Ibrahim and Onwualu, 2005) castor oil 35-55%, linseed 35-44%, Niger seeds 38-50%, neem kernels 45%, rape/mustard seed 40-45%, sesame 35-50%, fresh coconut 35-50%, dried coconut copra 64%, palm kernel nuts 46-57%, sheanut 35-44%,Akinoso *et al.* (2006a) reported average oil yield 47% for palm kernel, Akinoso *et al.* (2006b) for sesame seeds with 34.78%, Ejikeme (2013) reported 42.42% oil yield for wild bush mango seed, Premi and Sharma (2013)reported 33.3% oil yield for moringa seeds, Bamgboye and Adejumo (2013). However, some lower oil yields were reported for some seeds and nuts like cotton seeds 15-25%, sunflower seeds 25-40%, Adepoju and Okunola (2013) for sorrel seeds with 17.85% oil yield.The summary of the results obtained from the study is presented in Table 2.

Table 2 : Summary of the effect of Operating Parameters on oil Yield from African oil Bean

HT(^{0}C)	Ht(min)	MC (%db)		
		8	10	12
		Oil yield (%)		
50	5	28	31	25.6
	10	32.5	34.7	28.5
	15	34	35.6	26.7
	20	33.5	34.8	31.1
	25	34.5	35.2	30
70	5	34.5	35	30.5
	10	35.5	36.7	29.5
	15	35	36.9	33.3
	20	34.5	35.8	33
	25	36	37.3	34.2
90	5	39.5	41	33.6
	10	41.5	43.5	31.2
	15	50.5	52.3	48.5
	20	44.5	45.6	36.9
	25	40.5	41	36.5
110	5	38.5	39	37.5
	10	40.5	41.9	36
	15	39.5	42.3	32.1

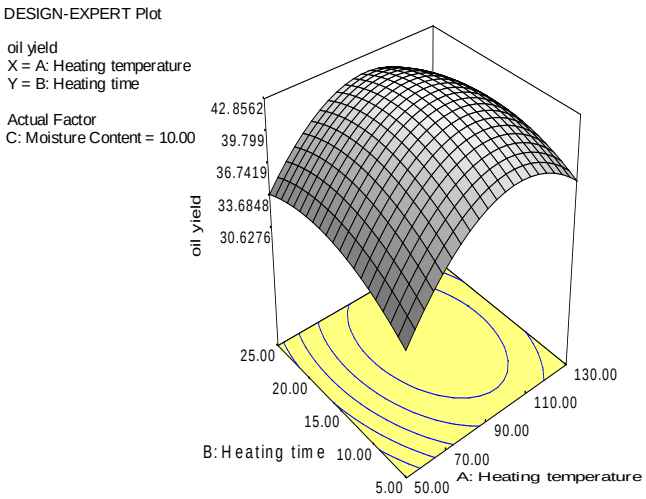
	20	39	41	29.4
	25	35	37	31.3
130	5	34.5	35.2	31.4
	10	36.5	37.4	34.7
	15	36	37	33.4
	20	37.5	38.5	36.2
	25	38.5	39	37

It is apparent to note that oil yield varies with operating parameter, this apparent variations may be due to optimum level for appropraite physicochemical changes in oil seed.Model equation for predicting the oil yield from African oil bean seed is stated as below:

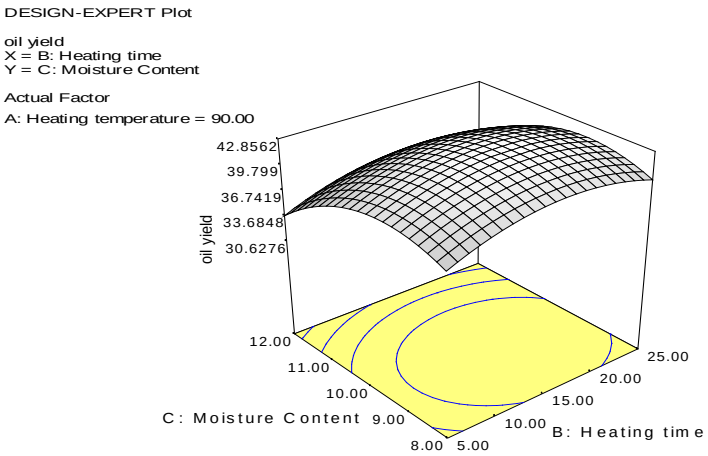
$$OY = -72.639 + 0.693\,HT + 0.897Ht + 15.81\,Mc - 0.00339HT^2 - 0.023Ht^2 - 0.879Mc^2 - 0.00187HT * Ht + 0.00235HT * Mc + 0.006Ht * Mc \text{ (R}^2\text{= 0.62, S= 3.25)}$$

Where: OY= oil yield (%), HT= heating temperature (^{0}C), Ht = heating time (mins), Mc = moisture content (%db), R = regression coefficient, S = Standard error of estimate.

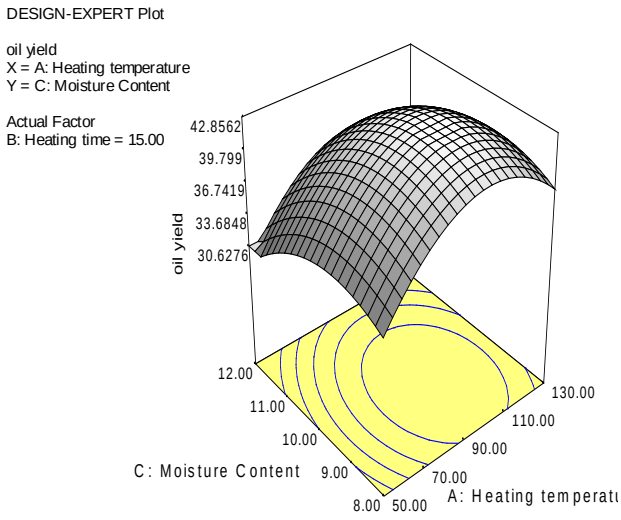
The response surface plots showing relationships between the operating parameters and oil yield from African oil bean seeds is presented in Figures 1a-c while the predicted and actual oil yield obtained is presented in Figure 1d.



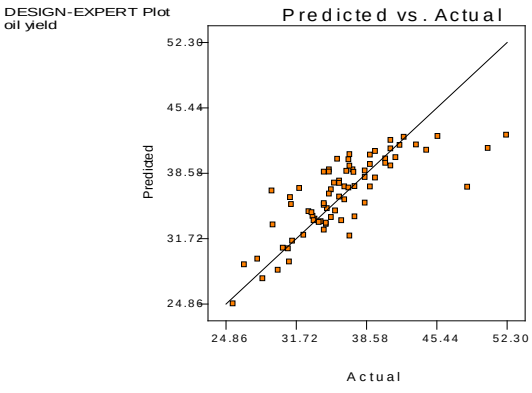
a



b



c



d

Figure 1 a-c : Response Surface Plots of Percent Oil Yield Extracted at Different Operating Conditions, d- Predicted Oil Yield VS Actual

IV. Discussions

Pre-treatment conditioning is a preliminary processing activity that involves size reduction, moisture content adjustment, heat treatment and pressure application (Ibrahim and Onwualu, 2005). These activities depend on the nature of the oil-bearing material, methods and devices adopted in the oil extraction. The moisture content of seeds is an important factor that affects the yield and quality of the oil extracted thus, moisture adjustment of the seed is necessary before pressing. From the studies, it was observed that moisture content, heating time and temperaturehad significant effect on oil yield from African oil bean seeds; a similar trend was reported by Akinoso *et al.*(2006a), Akinoso *et al. (*2006b)Ogunsina *et al.*(2008), Lawson *et al.* (2010), Abidakun *et al.* (2011), Bamgboye and Adejumo (2013),Santos *et al.* (2013), Adejumo *et al.* (2013a), Adejumo *et al.* (2013b), Orhevba (2013), Yusuf *et al.* (2014), Ogunsina *et al.* (2014) for sesame, palm kernel and sesame, palm kernel, cashew kernels, soybean, dika nut, roselle, highenergetic potential plants, moringa, watermelon seeds, neem seeds, groundnut oil, dika kernelsrespectively,

Heating of the seeds increases the oil yield due to beakdown of oil cells and decrease in oil viscosity which allow the oil to flow more readily though, prolonged heating beyond 15 minutes and temperatures above 90^0C did not improve the oil yield as there was vapourization and volatilization. This findings are in tandem with Adeeko and Ajibola (1990) for groundnuts, Sivakumaran*et al.* (1985) for peanut, Manuwa and Adenuga (2000) for palm kernel.

V. Conclusion

The effects of some operating parameters on oil yield and expression efficiency of African oil yield was determined, this is provide adequate guide/information needed for the separtion of oil from the seeds of African oil bean. The operating parameters considered include heating temperature, heating time and moisture content, mathematical model was developed to obtain the oil yield at any given operating parameter.

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3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

Criterion for Grading a Research Paper (Compilation) by Global Journals Inc. (US)

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Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

INDEX

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