Aims and Scope
The Nigerian Food Journal (NIFOJ) is a journal of international standard established in 1983 to provide a forum for the dissemination of interdisciplinary knowledge on all aspects of Food Science and Technology. In particular, NIFOJ is designed to contribute towards the development of new and improved food sources, products and their proper utilization by the Nigerian Food Industry and consumer, and their effective regulation by government agencies. For effective communication of special attributes and advantages of food products and materials, technical advertisements are encouraged in this edition to test acceptability. Subsequent editions may include a focus on the activities of a particular food industry in Nigeria.

Submission of Papers and Technical Adverts
Manuscripts of original research on all aspects of Food Science and Technology are welcome. Papers in original typing with two extra copies and the diskette all in line with new Authors Guidelines (see back pages) should be sent to the Editor-In-Chief, Nigerian Food Journal, c/o. NIFST, Federal Institute of Industrial Research, Oshodi, P.O. Box 2, Industrial Training Centre, Oshodi, Lagos, Nigeria. The artwork for the Technical Adverts should be sent similarly. The opinions and statements expressed by contributors are their sole responsibility. However, each feature article is reviewed prior to publication by scientific known to be experts in the subject area discussed in the article.

Subscriptions
The Nigerian Food Journal is an annual publication of the Nigeria Institute of Food Science and Technology. Subscription prices have changed slightly in response to the economy. Subscription prices for this issue are: Individuals in Nigeria N6000; Nigerian Institutions N1,000.00; African Countries US$55, including passages. A package subscription fee is offered to subscribers for the full series of NIFOJ (Vols 1-21). Interested subscribers should write to the Editor-In-Chief, at the above stated address.

All payments in form of bank drafts or certified cheques (N.I.P.C. accounts, etc.). are to be made to the Nigerian Food Journal, at the above stated address.

Single Reprints: Please address requests for single reprints to authors, whose addresses are found with each article.

Annual Membership Dues
Professional Members
Fellows
Corporate Membership
N25,000.00
N2000.00
EMMANUEL-IRIKEME, et al.............................................1

Sensory Evaluation, Proximates Composition and Rheological value of fortified Gari using barn banana flour.
AYIND AND OLUWASUN.......7

Nutritional, Physico-chemical and sensory evaluation of Sorghum and cowpea-based weaning formulation.
OJUWAMUKOMI, et al..................................................11

Some nutrient contents and functional properties of sorghum-toasted soy bean flour blends.
ONIMAWO AND ONOFUA..............................................18

Effect of Soy and Wheat variations on the functional and sensory properties of Cassava- Soy -Wheat Noodles.
DADAJIDE, et al..........................................................23

Standardization, Proximate composition and sensory evaluation of some Nigerian dishes.
OGUNTONA, et al........................................................29

Consumers' preference and proximate composition of fast foods prepared in some Nigerian eateries.
EBUELU AND BIKO....................................................36

Nutritional status of the flesh and body parts of some fresh water fish species in Zaria.
ADOLUDE AND ABDULLAII..........................41

Quantitative Estimation of Proximate, Amino Acid and mineral composition of some Nigerian fresh-water fishes (Family: Mochokidae)
ABDULLAAII.........................................................45

Chloride level in human milk from mothers resident in Kano, Nigeria.
AYODELE AND HASSAN.............................................50

Effect of Steaming on the Proximate composition and Physico-Chemical properties of Fuba flour made from two Cassava Varieties.
IWOOLA, et al..........................................................54

Safety and quality assessment of traditionally fermented Soybean enrichted Milk-based Beverage (Fura) 
UMOII.................................................................62

Nutritional Analysis of locally produced cocoa-based beverages.
DAINI, et al...........................................................70

Erratum: Kinetics of Vitamin C.
SOLANKI AND ANOWORIN...........................................76

Organoleptic assessment of selected fruit juice produced with Citrus Posaobina gum Powder (Okpo) extracted with the use of edible starches.
IWU, et al.................................................................79

Microbiological quality of Some Rice Cultivars.
OZUEGBI, et al......................................................85

Alpha-Amylase inhibitory activity in some African Millet Cereals
LASEKAN AND SALWA.................................89

The influence of Soya extracted soya flour in sorghum wata beer
ANH.................................................................94

Moisture desorption characteristics of powdered white yam (Dioscorea rotundata pura)
SATIMEHIN AND EZEIKE.................................99

Water absorption kinetics in some Nigerian varieties of soybean (Glycine Max) during soaking.
SANNI, et al........................................................106

Effect of Wormwood speed and moisture content on the capacity of a improved oil expeller.
OLAYANU............................................................113

Physical Properties of Nigerian Ginger (Zingiberis Officinalis Rosco) related to variety and maturity.
MFADOWS, et al....................................................117

Effect of Cooking and Fermentation on the fate of Aflatoxin B1 and B2 in contaminated millet flour and fresh cow milk.
CHELSA, et al.........................................................125

Comparison of growth and yield of oyster mushroom (Pleurotus sajor-caju) on three varieties of sawdust.
BANJIO, et al........................................................129

The effects of minerals, temperature and pH on growth of oyster mushroom (Pleurotus sajor-caju)
ANYAKORAH, et al..............................................133

Effect of drying methods on some qualities of Nigerian Pleurotus sajor-caju mushroom powder
OKIHE, et al........................................................137

Production and Evaluation of Powdered “Kunnu za’i” using the Fluidized bed dryer.
OBANWO AND ZIDON..........................................144

The breeding Value of Aflaozo Leibbeck seed meal in Broiler Diets.
CAREW, et al.........................................................147

Physico-chemical changes in “Ubere” (Mausobotrya Retteri, Berries during fruit development
LIBBAONU, et al..............................................151

Guide to Authors.....................................................155
EFFECT OF WORMSHAFT SPEED AND MOISTURE CONTENT ON THE CAPACITY OF A BENISSED OIL EXPELLER

OLAYANJU, T.M.A.
Federal Institute of Industrial Research, Oshodi,
P.M.B. 21023 Ikeja, Lagos.
E-mail: tiyanju@yahoo.

ABSTRACT
The effect of machine wormshaft speed and seed moisture content on the capacity of a cottage-scale oil expeller was studied using two benissed accessions, Yancey 55 and B8. The expeller has a barrel of 60mm diameter and a special wormshaft of 600mm length and was powered by a 0.75kW electric gear reduction motor. The machine capacity increased from 8.98 to 11.88kg/h and 8.91 to 11.52kg/h, respectively, for the two accessions as the moisture content increased from 4.1 to 5.3% wet basis at wormshaft speed of 30rpm. A further increase in moisture content to 10.3% decreased the capacities to 10.50 and 9.65kg/h, respectively. This was a general trend for all the wormshaft speeds (45, 60, and 75rpm).

The capacity of the expeller was highly affected by wormshaft speed, moisture content and seed accessions. It was found to be greater at lower levels of wormshaft speed and moisture content. The maximum capacities of 12.22 and 12.08kg/h were obtained at wormshaft speed of 60rpm and 5.3% moisture content for Yancey 55 and B8, respectively.

Keywords: Benissed, Expeller, Capacity, Wormshaft speed, Moisture content

Introduction
Mechanical expression of oil from oilseeds can be accomplished majority by using a plate press, an hydraulic press or an expeller. According to Orenyosa and Kolosco (1990), N-CRI (1995) and Tunde Akinfotede (2000), plate and hydraulic presses are of low capacities, time consuming and less effective. Therefore, an oil expeller, which expresses oil more efficiently is preferred.

Oil expeller has been described by UNIEM (1987) as an equipment having a horizontal rotating metal screw, which feeds oil bearing raw materials into a barrel-shaped outer casing with perforated wall. Most small expellers are power driven requiring about 3kW and are able to process between 10 to 50kg per hour of oilseed depending on the type of expeller used. Bigger units processing greater quantities are available for use in large mills. Some expellers have supplementary heaters fitted to the barrel to improve oil yield. The expressed cake has 5 - 18% (w/w) residual oil, depending on the type of oilseed and operating conditions (Rosedown, 1990 and Desai, 1996).

The effect of processing and operational parameters on expeller capacity, oil recovery and residual oil-in-cake of different oilseeds has been studied by several investigators. Khar and Hamm (1953) reviewed the expression of oilseeds in an expeller and their result indicates that pressure, temperature, pressing time and moisture content are the factors that affect expression of oil from oilseed. Sivalurman and Goodrum (1987) on the other hand, reported that peanut feed rate, oil expression rate, meal oil content, and expression efficiency can be controlled in a small screw press by varying the internal pressure of the screw press. They stated that a reduction in internal pressure led to the increased peanut feed rate and increased meal oil extraction rate in the initial stages, increased cake oil content and lowered oil expression efficiency.

Valko and Sasubki (1988) studied the effect of wormshaft speed, choke opening, and seed pre-treatment, i.e., moisture conditioning, flaking and preheating of canola seed in a small screw press. With reduction of choke opening and shaft speed, maximum pressure increased and both press throughput and residual oil in the cake decreased. When either the whole seed or flakes were preheated in the range of 40 to 100°C, the pressure and throughput increased and residual oil in the cake decreased. The press throughput and oil output were maximum at 5% moisture content (wet basis) while the residual oil showed a continuous rise with increasing moisture content. From the foregoing, its
important: that optimum processing and operational conditions for the expression of oil from beniseed be identified for higher oil yield and improve cake quality at minimum production cost. Therefore, the objective of this work was to study the effect of wormshaft speed and moisture content on the capacity of a specially developed beniseed expeller with a view to maximising its operation.

Materials and Methods

Machine Specifications

Most of the oil expellers available in this country could not perform effectively with beniseed because of its small size. Therefore, a functional power-operated expeller containing a special wormshaft rotating in a cylindrical barrel with perforations was developed based on the application of parameters obtained from the determined physical and mechanical properties of the seed (Olayanju, 2002). The machine specifications are as follows:

- Length of chamber, L (mm) = 300
- Diameter of Chamber, D (mm) = 6
- Length of Wormshaft, L_w (mm) = 600
- Number of worms, n = 6
- Worm pitches, P (mm) = 2 x 25, 37.5, 37.5, 37.5, 37.5, 37.5
- Depth of worm, h (mm) = 6.25
- Thickness of worm, e (mm) = 6.25
- Helix angle, α (degree) = 10
- Mean diameter of screw, D_m = 54
- Speed of rotation, N (rpm) = 45
- Power requirement, P (kW) = 0.75
- Speed of electric gear reduction motor, N_m (rpm) = 180

Experimental

Three experiments involving an interactive study of the three independent variables viz: wormshaft speed, moisture content and beniseed accession were carried out to evaluate the capacity of the fabricated oil expeller. Four levels of wormshaft speed, four levels of moisture content and two levels of beniseed accession were employed. The wormshaft speed was considered as the main plot, while the moisture content and beniseed accession were considered as the sub-plot and sub-sub-plot respectively. Fifty kilograms, each of the two common beniseed accessions — Yandey 55 and Y8 were procured from Azi Agric. Products Ltd., Apapa, Lagos. The seeds were cleaned using a specific gravity separator to remove dust, sand, dry leaves and empty capsules.

The moisture contents of the two beniseed accessions were determined by the oven drying method (ASAE, 1998). Methods described by Kachri et al. (1994) were used to adjust seeds to the desired moisture content. Dehulled beniseed samples were prepared by using HILYO established method (Olayanju et al., 2000). Two kilograms each of the dehulled beniseed samples was poured into the feeding hopper of the expeller. The speed was adjusted with the aid of a belt/pulley arrangement to the first speed. When a constant speed was indicated by the tachometer attached to the wormshaft, the feed control gate was opened for the seed to pass onto the expression chamber where the seed was crushed and compressed. The crushing time was noted. The capacity of the expeller was determined as the ratio of the crushed material to the crushing time.

Results and Discussion

Table 1 gives the data on the machine capacity from the samples at different wormshaft speeds and moisture content levels. Figures 1 and 2 show that there was an increase in the capacity as the wormshaft speed increased from 30 to 75 rpm at all the moisture content levels of 4.1, 5.3, 7.7 and 10.3% wb. Figures 3 and 4 show the effect of moisture content on the machine throughput. It was observed that the capacity increased as the moisture content increased from 4.1 to 5.3%. Further increase in moisture content to 10.3% led to a decrease in the press capacity. This was a general trend for all the wormshaft speeds (30, 45, 60 and 75 rpm) and for the two beniseed accessions. The maximum machine capacities of 12.99 and 12.08 kg/hour were obtained at wormshaft speed of 60 rpm and 5.3% moisture content for Yandey 55 and 88, respectively. Similar result had been reported by Kachri et al. (1985) while evaluating the performance of a baby oil expeller for oil recovery and energy consumption in relation to seed moisture and wormshaft speed. They observed that as the wormshaft speed and choke opening increased, the press throughput also increased. They further stated that the maximum press throughput was obtained at 5% seed moisture content. The observation in the present study may be due to the fact that as the wormshaft rotates, the beniseed material at 4.1 and 5.3% moisture contents were driven which were very chaffy, offered least resistance to the wormshaft movement, thereby leading to an increase in press throughput as the wormshaft speed
increased. However, at 10.3% moisture content, the material was relatively wet, thereby creating a resistant effect on the wormshaft movement and thus leading to a decrease in machine capacity.

**Conclusion**
The following conclusions are drawn from this research: The statistical analysis for machine capacity showed that the third level of wormshaft speed (60 rpm), the second level of moisture content (5.3%, wb) and Yandev-55 accession were the optimum experimental levels at 1.22 kg/h throughput. The machine throughput was highly affected by wormshaft speed, moisture content and seed accessions and were found to be greater at lower levels of moisture content and wormshaft speed.

**Acknowledgments**
Mr. H. Crowther, the Managing Director of the Afri Agri Products Ltd., Apapa, Lagos, provided the beniseed accessions used for the study. Mrs. M. O. Oresanya of the Chemical and Food Technology Division, IFORO assisted in dehulling the seeds.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Wormshaft speed (rpm)</th>
<th>Moisture content (% wb)</th>
<th>Crushing time (minute)</th>
<th>Machine throughput (kg/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yan dev</td>
<td>55</td>
</tr>
<tr>
<td>1</td>
<td>30</td>
<td>4.1</td>
<td>12.03</td>
<td>13.44</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>5.3</td>
<td>10.10</td>
<td>10.42</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>7.7</td>
<td>11.30</td>
<td>11.83</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>10.3</td>
<td>12.43</td>
<td>12.43</td>
</tr>
<tr>
<td>5</td>
<td>45</td>
<td>4.1</td>
<td>10.58</td>
<td>12.23</td>
</tr>
<tr>
<td>6</td>
<td>45</td>
<td>5.3</td>
<td>9.37</td>
<td>10.83</td>
</tr>
<tr>
<td>7</td>
<td>45</td>
<td>7.7</td>
<td>10.25</td>
<td>10.43</td>
</tr>
<tr>
<td>8</td>
<td>45</td>
<td>10.3</td>
<td>10.32</td>
<td>11.12</td>
</tr>
<tr>
<td>9</td>
<td>60</td>
<td>4.1</td>
<td>10.35</td>
<td>11.17</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
<td>5.3</td>
<td>9.08</td>
<td>9.93</td>
</tr>
<tr>
<td>11</td>
<td>60</td>
<td>7.7</td>
<td>10.13</td>
<td>10.40</td>
</tr>
<tr>
<td>12</td>
<td>60</td>
<td>10.3</td>
<td>10.28</td>
<td>10.58</td>
</tr>
<tr>
<td>13</td>
<td>75</td>
<td>4.1</td>
<td>10.20</td>
<td>10.77</td>
</tr>
<tr>
<td>14</td>
<td>75</td>
<td>5.3</td>
<td>9.23</td>
<td>10.28</td>
</tr>
<tr>
<td>15</td>
<td>75</td>
<td>7.7</td>
<td>10.02</td>
<td>10.43</td>
</tr>
<tr>
<td>16</td>
<td>75</td>
<td>10.3</td>
<td>10.08</td>
<td>10.73</td>
</tr>
</tbody>
</table>

**Figure 1:** Effect of wormshaft speed on machine capacity using Yandev-55 accession at different moisture contents of 4.1%, 5.3%, 7.7%, and 10.3%.

**Figure 2:** Effect of wormshaft speed on machine capacity using Yandev-55 accession at different moisture contents of 4.1%, 5.3%, 7.7%, and 10.3%.
References


