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Entrepreneurial Skill of Rural Women Through Utilization of Some Local Seed Extract (*Moringa oleifera* and *Anacardium occidentale*) in the Production of Skin Pomade: a Case Study of Umuahia South Local Government Area of Abia

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Abstract: This work is focused on the supporting of entrepreneurial skill of rural women through the utilization of some local seed extract like moringa and cashew nut oil in the production of skin pomade. Specifically, the study sought to find out if moringa seed oil and cashew nut seed oil can be used to produce skin pomade. Experimental method was used to carry out the study. Oil extraction from the two seed types was done using the conventional cold solvent extraction method. The quality of the oil was tested through the determination of specific gravity, smoke point, acid/free fatty acid, iodine value and saponification value. The result of quality characteristics of the produced oil showed that the oil were fresh without rancidity. Also the acid values and free fatty acid levels were all within the acceptable quality criteria for oil. Again the high iodine value of the moringa oil predisposes it to easy spoilage due to unsaturation. Both oil are non drying oil which makes them suitable for production of pomade. Based on the findings in this work, it is recommended that the use of vegetable oil in pomade production should be encouraged and also that the success should go beyond the laboratory result to a level of technology transfer through seminars and workshop for rural women who may adopt same for self-employment and poverty alleviation.

Key words: Entrepreneurial · Skill · Women · Local and Seed

INTRODUCTION

The Moringa tree, *Moringa oleifera* is native to India but has been planted around the world and is naturalized in many localities. Moringa goes by many names. In the Philippines, where the leaves of Moringa are cooked and fed to babies, it is called "mother's best friend" and "malunggay." Other names for it include the benzolive tree (Haiti), horseradish tree (Florida), Nebedey (Senegal) and drumstick tree (India) [1]. In northern Nigeria it is known in Hausa language as "Zogale" [2]. *Moringa oleifera* is the most widely known. It is a multipurpose tree known as nature's medicine cabinet [3]. Almost all parts of the plant are potentially useful. The seeds are probably the most useful part of the plant, containing a significant percentage of high quality oil. Moringa oil is a nondrying oil with a pale yellow consistency. Which has good antioxidant properties with potential for industrial, nutritional and health applications [4]. The oil which is sometimes known as 'ben oil', is used for a variety of purposes [5]. The cashew tree (*Anacardium occidentale*) is native to tropical America. The specie belongs to the class of the dicotyledons, order terebintals, family Anacardiaceae [6]. There has been growing interest in cashew and this can be ascribed to the purported dual role of the kennel: it can be used as a substitute for peanut and almond in the confectionery industry and as an important source of lipids and protein. The tree which is widely cultivated in Asia for its nuts and other products grows as tall as twelve meters with a thick and tortuous trunk and branches so winding that they frequently reach the ground.

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The cashew 'fruit' is very peculiar and is really not a fruit but a swollen pedicle that grow, behind the real fruit which yields, "the cashew [7]". This large pulpy and juicy part is a pseudo fruit with a true sweet flavor and aroma and the cashew nut grows externally in its own kidney shaped hard shell at the end of the pseudo fruit or pedicle which is commonly referred to as the cashew fruit or apple. The shell is 2-3m thick, with a leathery outer case and a thinner, harder inner case, between which is a honey combs structure containing the phenolic cashew nut shell liquid CNSL; an excellent source of phenol for polymer production [8].

The kernel is protected from the latter both by the tough skin and the inner case and is a rich source of protein, carbohydrate and the triglyceride, cashew kernel oil. The kernel and the shell liquid each comprise 20-25% of the nut which the remaining consists of the testa and the shell structure. Cashew kernel oil as a good source of vegetable oil has been recognized and this has found great use in domestic cooking and pharmaceutics [9]. Cashew kernels are of high nutritive value. It contains 21 percent of protein, fat (47%), moisture (5.9 %), carbohydrates (22%), phosphorus (0.45%), calcium (0.05%), iron (5%) for every 100 gm and other mineral elements. Cashew kernel contains 47 percent fat but 82 percent of this is unsaturated fatty acid, which lowers the cholesterol level in blood. The most prominent vitamins in cashew are Vitamin A, D and E, which help to assimilate fats and increase the immunity level.

The cashew has a long record as a useful plant, but only in the twentieth century did it become an important tree crop [10]. It has the potential to provide source of livelihood for the cashew growers, empower rural women in the processing sector, create employment opportunities and generate foreign exchange through exports. Today, the crop is extensively cultivated for its nuts which are good source of vegetable oils, however, processing the kernel to obtain quality edible oil has always posed problem for oil processor.

Edible oil can be extracted from cashew nuts but hitherto, there is no evidence of it being carried out commercially. Cashew nut contains oil of economic importance and due to the efforts of Nigerian government to improve the production of the crop; it is of economic interest to characterize and to improve the oil extracted from the abundant cashew nuts for making skin pomade and possible consumption as vegetable oil. This research is aimed at the extraction of *Moringa oleifera* seed oil and cashew nut seed oil locally.

Statement of Problem: In the recent times, there has always been a challenge of unemployment in Nigeria especially among the rural women. In other to solve this problem of rural women empowerment development, development of entrepreneurs skill of the women comes to mind. Entrepreneur skill development is however being plagued by the general problem of production in economics; of which two of these problems are 'what to produce and how to produce'.

Of late Nigerians have declined in the development and utilization of our local content in the production of many of our products. In fact little has been done in the development of entrepreneurial skills, instead, we have relied so mush in imported goods. It has gotten to the point that almost all we put on or rub (cream) on the body are often foreign. Little wonder we are tagged as people that consume what they don't produce and produce what they don't consume.

Moringa is well known to many people as plants with many medicinal properties. Some people use the leaves as soup vegetables while some others chew it fresh. The seed is been chewed also for its profound health benefits. Cashew has long been with us. The cashew apple is a succulent and highly perishable flesh widely eaten by many and cashew nuts are being roasted, the hard cover is removed and the nut eaten. Despite the fact that Nigeria is one of the major cashew producers in the world, it is worthy of note that the utilization of the fruit is still very low. The nut, most times, is discarded, after the consumption of the edible cashew apple, despite its richness in oil. Again, even though it has been discovered that edible oil can be extracted from cashew nut, a thorough characterization of the oil has not be carried out. The moringa is known for its numerous health benefit and cashew nut is highly regarded for its high industrial value in the developed countries but little or nothing is known about the oil in their nuts which can be useful in the production of pomade. This work therefore tends to discover and educate those in cosmetics industries of the inherent benefits in the utilization of moringa seed oil and cashew nut seed oil extract in the production of skin pomade.

Objective of the Study: The specific objective is to:
To determine if moringa seed oil and cashew nut seed oil can be used to produce skin pomade

Research Question: How can moringa seed and cashew nut seed be used to produce pomade?.

Significance of the Study: This study is highly beneficial to women entrepreneurs, those cosmetic industries and the members of the academia.

The women entrepreneurs will benefit as the success of this study will add to increase the variety of entrepreneurial skills available to women said society. The process of this production will be taught the women by talking the women leaders into organizing seminars for their subjects.

This study if successful will be beneficial to the cosmetic industries by opening opportunities into producing new products through the use of moringa and cashew nut oil.

The findings of this study will also add to knowledge for those in the academia. This work will also be useful to those that to do a related work as it will serve as a base material.

Scope of the Study: This work is on Supporting entrepreneurial skill of rural women on the utilization of some local seeds extract (*moringa oleifera* and *anacardium occidentale*). The study shall cover the determining how moringa seed and cashew seed nut oil can be used to produce skin pomade, utilization of moringa seed oil and cashew nut seed oil in supporting the entrepreneurial skill of rural women in the study area. The study will also determine if this pomade can be commercialized for economic benefits.

MATERIALS AND METHODS

Source of Materials: The cashew nut seeds used for oil extract was sourced from Okigwe, Imo State while Moringa seeds were purchased at Orie Ugba market, Ugba, Ibeku, Umuahia Abia State. Also the other additives like sheabutter and fragrance were purchased from cemetery market, Aba, Abia State. Laboratory and other facilities were obtained were obtained from Caslab Global Analytical Laboratory, Umuahia.

Extraction of Oil: Oil extraction from the two seed types was done using the conventional cold solvent extraction method [11]. The seeds were first prepared as described below:

Preparation of Seed Samples: For the cashew nut seed, the nuts were toasted on a metal plate placed over heat source (hot plate) with constant turning while the nuts became charred forming blade. At a point when the characteristic nut shell oil has been burnt up and smoking has stopped, the toasted seed where manually cracked and cotyledons where extracted. The extracted seed (plate 1) where later grind into a powdered meal in a laboratory mill and used for the extraction of oil.

Seed extaction (and preparation) from the moringa seeds (plate 2) was done manually. Each moringa seed was cracked open by rolling an empty beverage bottle over the seeds on a clean hard laboratory bench top. Thereafter, the cracked seeds were manually cracked to remove the husks while the cotyledons were gathered and used for the extraction of oil after grinding it to powdered mill in a laboratory mill

Extraction of Oil: Cold solvent extraction was employed followed by recovery of oil in a soxhlet apparatus. The method followed the description. In this regard, each processed sample (i.e the grind cashew nut and moringa seed) was measured out i.e three 100g portions of each. Each portion was mixed with normal hexane in the reaction of 1:5 (w/r). The resulting mixtures were corked tight in air proof screw capped sample bottles and shaking for 30 mins before allowing to stand overnight at room temperature. The next day, each soaked portion was agitated for 30 mins and than filtered through whatman no 1 filter paper to obtain the extract. (filtered). The residue in the filter paper was further washed with 100 ml of the pure solvent (to extract residual oil in particles). The extract containing the oil in solution of the solvent was transferred to a weighed oil extraction flask and coupled to a soxhlet apparatus.

The solvent in each mixture was recovered filling its vaporization and condensation in the soxlet reflux flask. The extracted oil was eventually left in the oil extraction flask and is collected gravimetrically. The oil in the extraction flask (previously weighed) was allowed to cool in a dessicator and their weighed. The oil yield was calculated based on the weight of oil obtained using the formula below.

$$\% \text{ yield of} = \frac{w_2 - w_1}{w} x100$$

W = weight of sample (g)
W_1 = weight of empty oil extraction flask.
W_2 = weight of flask and extracted oil.

Determination of Quality Characteristics of Oil Extracta: The oils extracted from the two test seeds were subjected to analysis to determine some of their phsico-chemical characteristics (their quality). The following methods were used.

Determination of oil Yield: The yield of oil was determined gravitationally as the percentage of the quatity of oil by weight extracted from the processed seeds in eache case. To determine this, a measured weight of the processed seed flour was extracted with excess solvent (n-hexane) in a cold extraction. After filtration, the oil extract in solution of the hexane solvent was recovered in a weighted oil extraction flask and weighed. By difference, the weight of oil was obtained and expressed as a percentage of the sample weight. The formula below was used.

$$\% \text{ yield of} = \frac{w_2 - w_1}{w} x100$$

W = weight of sample used.
W_1 = weight of empty extraction flask
W_2 = weight of extraction flask and oil extract

Determination Specific Gravity: This was determined using the pycnometer gravimetric method. Accordingly, the pycnometer (specific gravity bottle) was weighed when it was empty, clean and dry and with its stopper in place (wa). It was then filled with freshly distilled water up to the brim of the stopper capillary. The outside was wiped dry with a blotter paper. It was then weighed filled with distilled water (ww). I t was then weighed filled with distilled water (ww). The water was decanted and the bottle was dried (without heating to avoid expansion). It was then filled with the test oil up to the brim of the capillary of the stopper. The outside was wiped dry with a blotter soaked in n-hezane. It was then weighed filled the oil (ws).

The specific gravity (density) was calculated as the ratio of the oil weight to the that of an equal volume of distilled water (the volume of the pycnometer). The formular below was used.

$$S.G(g/cm^3) = \frac{ws - wa}{ww - wa}$$

wa = wt of empty pycnometer
ws = wt of pycnometer filled with oil sample
ww = wt of pycnometer filled with distilled water.

Determination of Smoke Point: Smoke point of the oil was determined as the temperature at which the oil gave a steady stream of smoke marking the commencement of release of volatiles. The method of [12] was used. The test oil was dispensed in small portions (10-15 ml) into a 20 ml glass beaker. The oil in the beaker was heated via a solid state hot plate while a celcius thermometer (0-300°C) was held over the beaker through a retort stand in a way that its bulb was immersed in the oil but without touching the bottom of the beaker. As the heating progressed, the oil was observed clearly and as soon as a steady stream of smoke was seen, the temperature reading on the thermometer was recorded as the smoke point. The experiment was dove three time with each oil and a mean value was taken.

Determination of Acid Value/Free Fatty Acid: This was determined by alkaline fitrimetric method (Onwuka, 2018). A unit weight of each oil sample (1g) was dissolved in a neutral ethanol-ether mixture solvent (25:25ml) (v/v). About 3 drops of phenolphthaleine indicator was added to the oil in solvent and it was filtrated against dilute alkaline solution (0.1 N NaOH). Titration was done to a prink and point which persisted for up to 15 seconds. Each sample was analyzed in triplicate. The formula below was used for the calculation.

$$Acid\ value = \frac{T\ x\ N\ x\ 56.1}{w}$$

where,
w = weight of oil sample analysed
N = Normality (concentration) of filtrate alkaline solution
T = titre value (volume of alkali consumed)

$$FFA = \frac{Acid\ Value}{2}$$

Determination of Peroxide Value: This was done to assess the level of rancidity of the oil before using it for pomade production. The thiosulplate filtration method was used [13].

A unit weight (1g) of each oil sample was measured into a conical flask and a pinch of powdered potassium iodide was added to it. Exactly 20 ml of mixed solvent (2:1 glacial acetic acid: Chlroroform) was added to the oil and mixed to dissolve. It was boiled over a flameless mixed to dissolve. It was boiled over a flameless heating block (hotplate) for 30 seconds (from the time it started boiling). It was carefully poured quantatively into a flask containing 20 ml of 5% potassium iodide solution. Distilled Nater (25 ml) was used to rinse the flask and pooled into the second one which was thereafter titrated against 0.002m sodium thiosulphate ($Na_2S_2O_3$) solution using 1ml of 1% starch solution as indicator. The perioxide value was calculated using the formula below:

$$PV = \frac{100x}{W}\ N\ x\ T$$

W = weight of oil sample
N = normality (conc.) of titrant (thiosulphate soluble)
T = titre value.

Determination of Iodine Value: The titrimatric method [14] was used. In this regard, 0.2g of the oil sample was dissolved in 10 ml carborn tetrachloride (Tetrachloro methane) and 20 ml Wij's solution was added to it, mixed very well and accured to stand at room temperatue in a dark capboard for 30 mins. Then 15 ml of 10% potassium iodide was added to it followed by 100 ml distilled water. It was then filtrated against 0.1m sodium thiosulphate solution using 1ml of 1% starch solution as indicator. Titration was done to an end point marked by the disappearance of the characteristics iodine colour (clearance).

A reagent blank was set up and treated as described above. The iodine value was calculated using the formula below:

$$IV(mgi) = \frac{(B-T)x1.26}{W}$$

B = Titre value of reagent blank
T = Titre value of sample
W = weight of sample analysed.

Determination of Saponification Value: This was determined in line with the acid titration method [15]. A measured weight (2g) of each oil sample was saponified by boiling in 25 ml of alcoholic potassium hydroxide solution. Boiling was done under reflex for an hour. Then 1 ml of 1% phenolphthalein indicator was added to it and mixed well before titrating against 0.5M hydrochloric acid until the pink colour cleared. A reagent blank was set up and treated. The saponification above. It was also filtrated. The saponification value was calculated using the formula below:

$$\text{Sap value (mgKOH/g)} = \frac{B-T\ \text{x}\ N\ \text{x}\ 56.1}{W}$$

B = Titre value of reagent blank
T = Titre value of sample
N = Normality of titrant
N = weight of sample analysed.

Production of Pomade: Production of pomade from the two vegetable oils, Moringa seed oil and Cashew nut seed oil, was done separately for each oil and in combination of the two oils in a ratio of 1:1(v/v). Pomade production was done according to the description of [16]. In this regard, the gelling material was wax and shear butter, a normal waxy product of plant origin that is used for skin and hair conditioning. A measured weight of the gelling material (5)g, each was melted by heating in a beaker with constant stirring under laboratory conditions. On melting, (15g) of shear butter was added, followed by the (10 ml) each of the extracted oil to the melted wax while the heating and stirring continued to obtain homogeneity. Thereafter, fragrance where added to it. The stirring was continued for complete mixing and homogeneity. The fully mixed pomade was removed from heat and allowed to cool to room temperature and solidify. The cold soft solid pomade produced was subjected to sensory evaluation.

Sensory Evaluation of Pomade: Sensory evaluation of the produced pomade was undertaken to determine the acceptability of the product (an assessment that point to market performance of products). The method described by [17] was used. A 9-point Hedonic scale was used and a ten man panel of partially trained persons comprising Trainee staff of CesLab Analyticals and volunteer Students of Michael Okpara University, Umudike and Abia State University, Umahia campus. Five sensory attributes were assessed including Colour, Fragrance, Texture (hand feel), oiliness and General acceptability. The obtained sensory scores were computed and subjected to statistical analysis.

Hedonic Scale:

9 = Liked extremely
8 = Liked very much
7 = Liked moderately
6 = Liked slightly
5 = Neither liked nor disliked
4 = Disliked slightly
3 = Disliked moderately
2 = Disliked very much
1 = Disliked extremely

Statistical Analysis: All the obtained data of results from the different analyses carried out were subjected to statistical analysis of variance (ANOVA) using the Statistical Software SPSS, version 20.

RESULTS AND DISCUSSION

Table 1 show results of oil extract analysis indicative of the quality of both oils. From the results, there were variations in the quality characteristics of the two oils.

Table 1: Quality characteristics of Cashew nut seed and moringa seed oil extracts

Oil sample	Yield (%)	SG (g/cm3)	Smoke point°C	Acid value	FFA	IV (mgI/g)	PV (meq/Kg)	SV (mgKOH/g)
Cashew nut oil	44.21 %	$0.955^{a} \pm 0.001$	$206^{a}.0 \pm 4.00$	$8.79^{a} \pm 0.32$	$4.40^{a} \pm 0.16$	$39.13^{b} \pm 0.36$	$4.74^{a} \pm 0.12$	$139.32^{b} \pm 0.81$
Moringa seed oil	36.42 %	$0.909^{b} \pm 0.001$	$203^{a}.0 \pm 5.00$	$7.19^{b} \pm 0.17$	$3.74^{b} \pm 0.16$	$56.26^{a} \pm 0.36$	$3.74^{b} \pm 0.12$	$186.06^{a} \pm 0.81$

Values show means of triplicate analysis ± standard deviation. Figures with different superscripts in the same column are significantly different (p? 0.05).

Table 2: Mean sensory scores of pomade produced with Cashew nut seed and moringa seed oil.

Samples	Colour	Fragrance	Texture	Oiliness	Acceptability
Cashew oil pomade	$6.67^{a} \pm 0.58$	$6.67^{a} \pm 1.16$	$7.33^{a} \pm 0.58$	$6.00^{b} \pm 0.00$	$7.33^{a} \pm 1.16$
Moringa oil pomade	$6.67^{a} \pm 0.58$	$6.33^{a} \pm 0.58$	$7.33^{a} \pm 1.16$	$6.67^{a} \pm 0.58$	$7.67^{a} \pm 0.58$
Mixed oil pomade	$7.33^{a} \pm 0.58$	$6.67^{a} \pm 0.58$	$7.67^{a} \pm o.12$	$7.00^{a} \pm 0.00$	$7.33^{a} \pm 0.58$

Values show means of ten replicate scores ± standard deviation. Figures with different superscripts in the same column are significantly different (p?0.05)

Cashew nut seed oil had a yield of 44.21% while Moringa seed oil yielded 37.42%. The specific gravity of the oils were 0.955g/cm3 and 0.909g/cm3 for cashew nut seed and moringa seed oils respectively. Acid value was 8.79 for cashew oil and 7.19 for moringa oil while Free Fatty Acid was 4.4 and 3.74 for the respective oils. The iodine values were 39.13mgI/g and 56.26mgI/g. Results of Peroxide show low values of 4.74meq/Kg (cashew) and 3.74meq/Kg (moringa) while the Saponification values recorded 139.32mgKOH/g and 186.06mgKOH/g. The results show that there cashew nut seed oil had higher density, smoke point, acid value and peroxide value than the moringa seed oil which in turn had higher iodine value and saponification value.

Table 2: show the mean scores of the sensory attributes of the produced pomades. The result show acceptability preference for moringa oil pomade over the cashew oil pomade and the pomade from a mixture of both oils [18] [19]. The mean acceptability score of the moringa oil was 7.67 which translates to 85.22% acceptability on the 9- point scale while that of the cashew oil pomade and the pomade from the mixed oil were 7.33 each equivalent of 81.44% acceptability [20]. However, there was no significant difference between the scores for the three pomades. Again, the pomade from the mixed oil got the highest scores for colour(7.33), texture(7.67) and oiliness (7.00). The scores for colour was 6.67 for both Cashew oil and moringa oil pomades and 7.33 for texture on both. The scores for all the different sensory attributes did not show any significant difference between the pomade products [21].

DISCUSSION

The result of quality characteristics show that with oil were fresh without rancidity. Also the acid values and free fatty acid levels were all within the acceptable quality criteria for oil. However, low saponification value of the Cashew Nut seed oil imply that it may not be suitable for soap making while in contrast, the moringa seed oil makes it suitable for making soap [22]. Again the high iodine value of the moringa oil predisposes it to easy spoilage due to unsaturation. Both oil are non drying oil which makes them suitable for production of pomade.

The produced pomade was generally acceptable to the assessers with high mean scores for the different attributes [23] [24]. The high scores for colour is desirable as colour is a major quality factor for product and which has to do with aesthetic values. The oil had acceptable colour impact on the pomades. The scores obtained for all the attributes like high mean score for the oiliness of the pomade imply that the pomades were produced with a good mixture of the oil gelling materials (wax) which resulted in accepted oiliness [25]. In all the pomade were good and acceptable.

From the result of obtained, there is no doubt that the production of the pomade from the two oil was feasible and successful. This is support of the hypothesis that pomade can be produced from this vegetable oil.

The success of this work is indicative of the prospects of this venture and potentials of its application on the larger scale for self-employment of individual especially the rural women [26]. Although this project work recorded good success in a cheap easy technique for home made pomade production, there is concern for sourcing of raw materials as both seeds, Cashew Nut seed and Moringa seed are currently in high demand at industrial level. But there is prospects on a medium to the long term application as both trees grow well in this part of the world and produces seed within the same year of planting [27] [28]. In this regard, prospective entrepreneurs can start by planting their trees in homestead farm or plantation to be sure of availability of the seed for oil extraction and use in making pomade [29] [30].

CONCLUSION

From the result obtained, it was concluded that the two test seeds, Cashew Nuts and Moringa seeds have enough yield of oil to sustain their use ventures such as pomade making. Again the quality characteristics of both oil are good and the use of the oil making pomade was feasible and successful while the pomade product were very acceptable to the panelists. There is therefore good potentials and prospects that this venture can be use for self-employment especially for rural women as the techniques is cheap and materials quite available.

Recommedation: Based on the findings in this work, it is recommended that the use of vegetable oil in pomade production should be encourage and also that the success should go beyond the laboratory result to a level of technology transfer through seminars and workshop for rural women who may adopt same for self-employment and poverty alleviation.

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