SENSORY EVALUATION AND PROXIMATE ANALYSIS OF DISHES DEVELOPED FROM VARIETIES OF POTATOES AVAILABLE IN THE LOCAL MARKET IN YEWALAND, OGUN STATE.

OGUNYEMI, O. AND ADEBAYO, J. A.
DEPARTMENT OF HOSPITALITY MANAGEMENT,
THE FEDERAL POLYTECHNIC, ILARO, NIGERIA.
ogunyemiolawale2014@gmail.com; 08036386587

ABSTRACT

The research was carried out to determine the sensory evaluation of dishes that were developed from four varieties of potatoes available in the local market in terms of colour, appearance, texture, flavour, taste and overall acceptability. In order to achieve this, 9-point hedonic scale sensory evaluation forms were used to collect data from 50 taste panelist who are mainly academic and non-academic staff of the Federal Polytechnic Ilaro. Convenient sampling method was used in selecting the taste panelists. The data collected was subjected to descriptive and inferential statistics using SPSS version 20.0. The result shows that there is no significant difference in the colour, appearance, texture, flavor, taste, and overall acceptability of the samples. Associayion of Official Analytical Chemists, AOAC (2000) was used in analyzing the proximate composition of the dish samples and it was recommended that since there is no difference in the varieties of potatoes used in this study, the potatoes should be used to prepare the various dishes.

Keyword: ***Food Culture, Potatoes, Potato Dishes, Sensory Evaluation, Yewa Land.***

1.0 INTRODUCTION

Potato (Solanum tuberosum L.) is a starchy, tuberous crop, potatoes are among the most consumed vegetables worldwide and among the most versatile and palatable of foods (Bamberg and Greenway, 2019). Potato is an important food and cash crop in world and plays a major role in national food security. The crop contributes in alleviation of poverty and income generation by providing employment opportunities in production, processing and marketing sectors, thereby contributing to the national food security goals. Potatoes (Solanum tuberosum, L.) is among the major agricultural crops that are consumed by a large population of people in different countries,they are processed industrially to a number of ready-to-eat product types (Alessandrini, Balestra, Romani, Rocculi and Rosa, 2015). The consumption of potatoes has started at around four centuries ago. Now consumption of potato has become part of day-to-day diet for millions of people. It is the fourth most consumed crop next to maize, wheat and rice. In general, the consumption of potato is shifting from the consumption of fresh potatoes to processed potatoes. Producing processed potatoes that have consistent quality is one of the challenges that are facing the food industry especially in the recent time (FAO, 2017).

Potato, though not a traditional staple food in Nigeria, but it is becoming an important agricultural commodity in some countries. It is grown in the highland zones of six regions: North West, West, Adamawa, South West, Far North and Littoral with the Western Highlands (North West and West regions) accounting for 80% of the national production (Fontem, Demo and Njualem, 2014). The crop has now assumed a cash-food crop status with an annual tonnage of over 250,000 tonnes, grown on over 70000 hectares in Nigeria (FAOSTA, 2014) and is one of the main sources of revenue to farmers of these regions.

Potato is commonly consumed in the form of boiled and cooked meals in different traditional dishes or 'wot'. Recently, consuming potato chips, crisps, and roasted potato has become common practices; especially in cities like Addis Ababa, Hawassa, Adama, Mekele, etc. In urban areas, it is also usually consumed mixed with other vegetables as salad (Bezabih and Mengistu, 2016). Large scale potato processing is under the process of establishment in Nigeria. In large cities like Addis Ababa, it is common to see hotels, restaurants and cafes prepare homemade French fries and Chips from potato. Whenever urban consumers go out for recreation, they often prefer go along French fries and chips for snacks. The street vendors also prepare chips that are supplied to consumers at dusk. Meanwhile, the economic importance of potato manufacturing industries has not yet been attained; and quality potato varieties for processing have not been identified.

1.1 Objectives of the Study

The objective of the study is to assess the sensory qualities of dishes developed from varieties of potatoes available in local market in Nigeria, determine the proximate composition of the samples of dishes and to carry out microbial load count of the dish samples

1.2 Statement of the Problem

The decreased awareness of people on the usefulness of the varieties of potatoes available locally.in Njgeria cannot be over-emphasized, there is no gainsaying the fact that potatoes have been underutilized in the country despite their abundant availability in various varieties. That is why the research study was carried out to develop varieties of dishes from potatoes.

2.0 LITERATURE REVIEW

2.1 Concept of Potatoes

Potato crop (Solanum tuberosum L.) is considered as one of the demanded crop for its agronomic value and economic return in the organic farming systems (Thorsten, 2007a). Potatoes into various consumer products have developed very rapidly as the industrial processing increased during the past years in different countries of the world. Globally about 10% of potato converted into consumer products such as French fries and potato chips or as other consumer processed products. The organic farmers of the European countries are producing organic potato for the industry. Organic potato raw materials for industrial processing have become a new source of income for them and the demand is increasing (Sylvander and Le Floc'h-Wadel, 2010). However, the processed forms are mainly used in the Europe and North America where the daily one two thirds of potato consumption is as the processed forms (Keijbets, 2018). About 180000 hectares of land are used for the cultivation of potatoes in the Netherlands.

Potato (Solanum tuberosum L.) is the most important food crop in the world after rice and wheat (FAO 2010). In addition to its culinary versatility, the potato has the advantage of being a low-cost product, so it is available to all social classes (Filgueira 2015). Today, this vegetable is the most important food in terms of volume of consumption and economic value. For example, in Brazil, the potato, along with the onion and tomato, are the most economically viable, in terms of volume produced and income generated (Costa, 2017). In 2010, Brazil produced a total of 3,459,183 tons of potatoes, with 8.5% of this total being produced in the northeast region, mostly in the states of Paraíba and Bahia, the latter with 290,680 tons per year (Agrianual, 2014).

Potato is one of the most popular vegetables worldwide and is the most important vegetable crop in the United States, accounting for nearly one-third of per-capita vegetable consumption (Lin and Yen 2014). Potatoes can be prepared in many ways, including baking, boiling, roasting, frying, and microwaving, allowing for a diversity of uses. Most people find potatoes to be an agreeable food, and very few (less than 1%) actually dislike potatoes (Harper 2016).

Potato (Solanum tuberosum L.) is a starchy, tuberous crop from the Solanaceae family, which is the third most important food crops in the world after rice (Oryza sativa L.) and wheat (Triticumaestivum L.) in terms of human consumption (Muhammad, 2013; Majeed, 2014). Potato can be used as both food grain and vegetable. This nutrient rich tuber contains high-quality starches, proteins, minerals, dietary fibre and vitamins (Yusuph, et al., 2013; Burlingame, 2019). Potato contains more abundant crude fibre than rice and wheat flour, and its quality of protein, which is rich in lysine and tryptophan, is superior to that of soybean (Glycine max (L.) Merr.). Potato is rich in vitamin C and- is thus known as "underground apple". Its calorific value is one to three times higher than that of other identically measured vegetables, and is thus known as "second bread" and "the king of vegetables" (Reyniers et al., 2018; Glusac et al., 2018; Bagri, 2018a; 2018b). Potato is regarded as one of the best foods in the world and one of the ten most popular health foods in the new century. For more than 50 years, the potato industry has developed rapidly worldwide (FAOSTAT, 2015). In Western Europe, United States and Japan, potato has already become a staple food.

In Africa, potato performs an increasingly important role in people's daily life. In China, potato staple strategies have been proposed. Developing potato industry can solve the world food crisis, improve the dietary structure of people worldwide and promote sustainable agricultural development in various countries (Gancarz, 2018). The development of the potato industry is mainly focused on research on potato planting and related products. Potato, which presents broad market prospect, can be used for fresh food and as raw material to produce various products, such as starch, French fries, potato chips, whole powder and pigments (Rafiq and Ghosh, 2017). The demand for potato and its subsidiary products become exceedingly high with the continuous promotion of the strategic position of potato worldwide. Hence, research and development on potato and its subsidiary products have become a hot research topic for scientists. Potato can be made into mashed potatoes after washing, peeling, removal of bud eye and cooking. This type of mashed potatoes exhibits superior palate, better flavour and better nutritional value to that prepared

from potato flour (Álvarez et al., 2015; Miao et al., 2018). Mashed potatoes are one of the most popular potato products because of its ease of preparation and consumption (Álvarez et al., 2011).

Potatoes provide different types of nutrients and vitamins (Kärenlampi and White, 2019). They are source of different minerals like iodine (I), copper (Cu), iron (Fe), potassium (K), manganese (Mn), phosphorous (P), zinc (Zn), magnesium (Mg) and calcium, (Ca) (USDA, 2014).

Based on USD Anutrient profile data, baked potatoes are good source of vitamin B6, vitamin C, folate and niacin (USDA, 2014; USDA, 2015). However, the quantity of vitamin C and other nutrients may differ greatly depending on cultivars, soil condition, environment and storage conditions (Singh et al., 2009). Various investigations showed that there is more retention of fat soluble vitamins in potatoes during heat-processing. Augustin et al. (2018) recorded more retention of vitamin C, riboflavin, thiamin, folic acid, niacin and vitamin B6 in whole baked, boiled and baked in microwave.

Currently, there is an increase awareness of consumers regarding nutrition and health and they demand better food with high quality in short time. But the major challenge is to reduce as much as possible acrylamide levels in fried potatoes and maintaining intact their sensorial properties and low oil content. Similarly, better quality intern of organoleptic properties like taste, color, flavors are also important parameters among researchers (Akilen et al., 2016).

2.2 Physico-Chemical and Sensory Evaluation of Potato (Solanum Tuberosum L.) after Irradiation

Ivanesa, Edvane, Ademir, Erilane, and Josenilda, (2016). evaluated the effects of ionizing radiation on the physico-chemical and sensory characteristics of the potato cultivar Ágata (Solanum tuberosum L.), including budding and deterioration, with the end goal of increasing shelf life. For this, four groups of samples were harvested at the maturation stage. Three of them were separately exposed to a Co-60 source, receiving respective doses of 0.10, 0.15 and 2.00 kGy, while the non-irradiated group was kept as a control. All samples were stored for 35 days at 24 °C (± 2) and at 39% relative humidity. The following aspects were evaluated: budding, rot, loss of weight, texture, flesh color, moisture, external and internal appearance, aroma, soluble solids, titratable acidity, vitamin C, protein, starch and glucose. The results indicated that 0.15 kGy was the most effective dose to reduce sprouting and post-harvest losses, under the conditions studied. Irradiation improves food preservation and is a process where fruits and vegetables, already packaged or in bulk, undergo a controlled amount of radiation. However, dose levels of radiation useful for improving food shelf life can adversely affect their sensory quality (Rocha and Sousa, 2017).

2.3 Physicochemical changes of potato during cooking

The majority of the dry matter of the potatoes is made up of starch. The amount of starch in potatoes varies from one cultivar to another cultivar thus resulting in different cooking properties. The gelatinization of starch in the potato during boiling affects how consumers perceive the taste and

texture. Potato starch is made up of 21% amylose and 79% amylopectin polymers of glucose. Starch is found in the cells of the potatoes in the form of amorphous starch granules ranging in the size of 20 - 100 μm. During boiling of potatoes with water at the temperature range of 52°C to 72°C, the bonds of the starch molecules starts to break down and engage in binding of more water molecules. This phenomenon leads to the swelling of starch granule and increase in size. Eventually, the incorporation of water molecules in the starch granules causes the soluble amylose molecules to leach out to the surrounding water and the cell to burst and disintegrate. (Bettelheim and Sterling, 2015). The pectin in the cell wall that helps to keep the whole structure of the cell is broken down by pectin methylesterase enzyme (Jarvis, 2018). These combined effects lead to the breaking down of the cementing intercellular bond and thereby creating separated cells. Which induces a soft texture upon eating (Sterling, 2015). In addition to this, boiling of potatoes will result in a loss of vitamins, minerals and free amino acids. The free amino acids have a tendency of forming complexes by reacting with sugars. Furthermore, reactions such as activation of enzymes, denaturation of proteins, starch swelling and gelatinization will take place. (Macholz, 2016).

2.4 The cooking quality of potatoes.

The cooking quality of potato is dependent on a number of factors such as maturity, fertilizers, growing conditions (seasonal climate and physical conditions of the soil), handling, storage conditions etc. In the study of the textural changes of cooked potatoes, the cooking quality of the potatoes and starch content, pectic materials present, specific gravity have shown a strong statistical correlation (Bettelheim and Sterling, 2015). In another study of the behavior of cooked potatoes, it was discovered that there was a correlation between the dry matter content, sensory perceived texture properties and the starch content (Van Dijk et al., 2012).

Studies have shown that orthologous pectin methyl esterase (PME) gene may have effect of the texture of the different fruits. The more the amount of PME gene expression the more the in the change of the texture of the potato. Pectin is the main part of middle lamella and cell wall. It has effect in the texture of the potato (Ross et al., 2010).

Frequently, fresh potatoes are selected by the consumers based on the information given by the retailer that the potato is either mealy or non-mealy. Texture is one of the important quality attributes for consumers. A number of European countries divide the texture of cooked potatoes from A to D by the sensory analysis perceived attributes. Sensory analysis of a product is usually labor intensive, subjective and not suitable for industrial applications. Therefore, the industry is always in need of the technology that could replace the sensory analysis. A number of attempts have been made to replace and correlate the sensory analysis attributes with the instrumental analysis. It is found that shear tests could differentiate non-mealy potatoes from mealy potatoes (Mccomber, 2017). Softness, mealiness, and dryness sensory attributes were correlated with penetration tests (Böhler, 2017). The use of specific gravity to predict the texture of potato is also one method to predict the sensory attributes. The study conducted to check the correlation between dry matter and texture of potatoes shows that there is in fact a correlation. The mealy-ness of a potato is correlated with high dry matter content (Warren and Woodman, 2014).

A number of studies shows that dry matter content is highly associated with different quality aspects of a potato. It has a role in determining how the end product of a potato should be. For example, the frying industry prefers potatoes having higher dry matter content. Studies show that potato dry matter is positively correlated with its specific gravity and the yield. The dry matter of potatoes can range from 16.5% to 24%. This reading is correlated to the specific gravity of 1.055 to 1.095 (Services, 2016).

2.5 Evaluation of Processing Attributes of Potato (Solanumtuberosum L.) Varieties

Habtamu, Wahassu, and Beneberu, (2016). Examined the number of improved potato varieties have been released by different research centers; with much emphasis on adaptability, productivity and late blight resistance, while it has been given less or no emphasis to processing attributes. Therefore, field and laboratory experiment was conducted at Haramaya, Hirna and Arberekete; allin Eastern Ethiopia to evaluate processing quality attributes of 16 released varieties (Moti, Belete, Bubu, Ararsa, Gudenie, Bule, Gabissa, Marachare, Harchassa, Gera, Gorrebella, Guassa, Jalenie, Bedassa, Zemen & Chiro) and two local cultivars (Bette & Jarso). The experiment was laid in a Randomized Complete Block Design with three replications. Chips were prepared by frying tubers with sunflower oil, which was evaluated by the consumer panelists. The results revealed the significant variations in most of the traits. The highest peel content (22.147%) were observed for Bedassavariety and total sugar content (1.058%) was observed for Jarso cultivar, reducing sugar (0.0618%) was recorded for Bette cultivar. The maximum rate for sweetness (2.84), saltiness (2.36), soreness (2.32) and bitterness (2.44) were observed for chips made from potato slices of Bubu, Gorrebella, Gorrebella, Ararsage no types respectively. Jarso, Bedassa, Motiand Jarsoscored the maximum rate for color (3.88.) crispness (3.24) and flavor (4.44), texture (3.24) respectively. Zemen (7.40) very much liked, as judged from over all acceptability. This study result reviled that the genotype and growing environment has a great influence on processing quality of potato tubers. Finally it is suggested that the importance of testing genotypes across location to recommend varieties for specific end uses; potato processer and producer.

3.0 MATERIALS AND METHODS

3.1 Methodological Background Details

The study was carried out at the HND kitchen in the department of hospitality management in Federal Polytechnic, Ilaro which is located at Ilaro, Ogun state in the South West part of Nigeria. The Federal Polytechnic, Ilaro is a Federal-Government owned tertiary institution which was established by law on July 25, 1979 and opened her gates to the students on November 15, 1979 on a temporary site provided by its host community, the ancient town of Ilaro. The polytechnic moved to its permanent site along Ilaro/Oja-Odan road, about three kilometers from Ilaro Township. The polytechnic occupies a total of 898.116 hectares land area on its permanent site.

This region has just two seasons which are the dry and rainy season. The rainy season comes from the month of May to early August while the dry season comes from the month of October till April. The master plan of the Polytechnic depicts two distinct campuses for the institution, that is, East and West campuses. This study area was the best choice for the prompt and close view to conduct and to evaluate

the quality of four varieties of potatoes selected for the study and studying their sensory taste, colour, appearance, texture and overall acceptability of dishes prepared from the selected varieties of potatoes.

The four varieties of potatoes used for this study were purchased from the local market in Idiroko communities from local traders. The other recipes such as butter, salt, black pepper vegetable oil, olive oil and flour were purchased from Sayedero market at Ilaro community, Ogun State. Some cooking equipments were gotten from HND kitchen in the department of Hospitality Management, Federal Polytechnic Ilaro.

3.2 Method of Preparation of the research food objects

3.2.1 Ultimate Roast Potatoes using yellow sweet potatoes

1. **Recipes:**

Items	Quantity
Yellow sweet potatoes	500g
Olive oil	100ml
Top flour	2 teaspoons
Salt	1 teaspoon

2. **Method of Preparation:** I put a roasting tin in the oven (one big enough to take the potatoes in a single layer) and heat oven to 200c/ fan 180c /gas 6, I peeled 1kg potatoes and cut each into 4 even sized pieces if they are medium size, 2-3 if smaller (5cm pieces), I drop the potatoes into a large pan and pour in enough water to barely cover them. Add salt, then wait for the water to boil. As soon as the water reaches a full rolling boil, I lowered the heat, and put tonner on and simmer the potatoes uncovered for two minutes, I put 100ml olive oil into the hot roasting tin and heat it in the oven for a few mins, so it is really hot, I drained the potatoes in a colander then shake the colander back and forth a few times to fluff up the outsides. Sprinkle with 2 top flour and give another shake or two so they are evenly and thinly coated, I carefully put the potatoes into the hot fat, they will sizzle as they go in, then turn and roll them around so they are coated all over. Spread them in a single layer making sure they have plenty of room, I roasted the potatoes for 15mins, then take them out of the oven and turn them over. Roast for another 15mins and turn them over again, I put the potatoes back in the oven for another 20mins to make them really golden and crisp, the colouring will uneven. Scatter with salt and serve straight away.

3. **Flow chart for Preparation of Ultimate Roast Potatoes using yellow sweet potatoes**

Peeling of potatoes

↓

Rinsing and draining of potatoes

↓

Adding of salt and olive oil

↓

Coating the potatoes with flour

↓

Roasting the potatoes on both sides

3.2.2 Buttered Potatoes Using Red Sweet Potatoes

1. **Recipes:**

Items	Quantity
Red sweet potatoes	500g
Olive oil	1 Tablespoon
Salt	1 Teaspoon
Butter	4 Tablespoons
Milled pepper	2 Teaspoons

2. **Method of Preparation:** I added potatoes to a large stockpot and add enough water to cover completely. Add olive oil and salt to season the water. Bring potatoes to a boil over medium heat and allow to boil until potatoes are fork tender, I removed from heat and drain off water. Add butter along with salt and pepper and stir until well-combined, I served warm.

3. **Flow chart for preparation of Buttered Potatoes Using Red Sweet Potatoes**

Peeling of potatoes
↓
Rinsing of potatoes
↓
Boiling of potatoes
↓
Draining of potatoes
↓
Adding of salt, milled pepper and olive oil
↓
Coating with butter

3.2.3 Baked Potatoes Using Irish Potatoes

1. **Recipes:**

Items	Quantity
Irish potatoes	500g
Butter	2 teaspoons
Salt	1 teaspoon
Black pepper	2 teaspoons

2. **Method of Preparation:** I heated oven to 450^0F. Line a large baking sheet with foil, I used a small paring knife, poke the potato at least ten times on all sides. Place potato on the prepared baking sheet, I baked for 25 minutes, remove baking sheet from the oven, I brushed with butter using a pastry brush until it is completely coated on all sides. Sprinkle the potatoes with a generous pinch of salt and place the potato back on the baking sheet, reverse side up, so that it can cook evenly on both sides, baked for another 20 minutes. Using an oven mitt, carefully squeeze the potato to check for doneness, I used a small paring knife, slice half way through the potatoes lengthwise. Then give it a gentle squeeze to open, I served hot.

3. **Flow chart for preparation of Baked Potatoes Using Irish Potatoes**

Peeling of potatoes
↓
Rinsing and draining of the potatoes
↓
Coating with butter, salt and black pepper
↓
Baking potatoes on both sides

3.2.4 Homestyle Potato Chips Using White Sweet Potatoes

1. **Recipes:**

Items	Quantity
White sweet potatoes	500g
Salt	2 Teaspoons
Vegetable oil	1 bottle

2. **Method of Preparation:** I placed potatoes slices into a large bowl of cold water as you slice. Drain, rinse then refill the bowl with water, and add the salt. Let the potatoes soak in the salty water for at least 30 minutes. Drain, then rinse and drain again, I heated oil in a deep fryer to 365 degrees F. Fry potatoes slices in small batches. Once they start tuning golden, remove and drain on paper towels continue until all of the slices are fried, I served hot.

3. **Flow chart for preparation of Homestyle Potato Chips Using White Sweet Potatoes**

Peeling of potatoes
↓
Slicing of potatoes
↓
Rinsing and draining of potatoes
↓
Adding of salt
↓
Deep frying

3.3 Research Population

The population for this research work were the academic and non-academic staff of Federal Polytechnic, Ilaro.

3.3.1 Sampling Size and Technique

A convenient sampling method was used in the selection of the taste panelist who are the respondent for the research study.

3.4 Instrument for Data Collection

All data were collected through the use of sensory evaluation sheet which was given to the taste panelist. A hedonic scale ranging in a descending order was used i.e. (9,8,7,6,5,4,3,2,1) by the taste panelist to determine the sensory attributes of dishes developed from the four varieties of potatoes. The attributes of the scale include; texture, aroma, appearance, color, taste, flavor and overall acceptability with the 9 points hedonic rating scale.

3.3.2 Data Collection Process

In sourcing of data for this study both primary source and secondary source were used. Primary data will be collected by administering the sensory evaluation form to gather necessary information about the potatoes using four different varieties. The secondary data are those obtained from journals and textbooks.

3.5 Data Analysis

The information collected from the sensory evaluation form was analyzed using a statistical package for social science called SPSS version 20.0. Analysis of variances was employed in order to

determine the significant differences in treatment means and least significant differences (LSD) analysis (P<0.005) to separate means.

3.5.1 Proximate Analysis

Association of Official Analytical Chemists, AOAC (2000) was used to analyze the proximate composition of the dish samples.

3.5.2 Microbial load count

Microbial load counts of the dishes were determined after 24 hours, 48 hours and 72 hours.

4.0 RESULTS AND DISCUSSION

Table 1 shows the different scores obtained from sensory evaluation of different samples which reflected the choice of panelists that were used for the research study. The score ranges from 9-1. In terms of colour, sample URP has the highest with mean (8.20) followed by sample BUP and HPC with mean (8.04) then sample BAP which has the lowest mean (7.98). Sample URP, BUP and HPC are like very much and sample BAP is like moderately. There is no significant difference in the colour of the samples.

In terms of appearance sample URP has the highest value with mean (7.80) followed by sample HPC with mean (7.78) then sample BAP and BUP with mean (7.76). All sample are like moderately. There is no significant difference in the appearance of the samples.

In terms of texture sample HPC has the highest value with mean (7.88) followed by sample BUP with mean (7.66) then sample BAP with mean (7.56) then sample URP which has the lowest value with mean (7.50). All samples are like moderately. There is no significant difference in the texture of the samples.

In terms of flavour sample URP has the highest value with mean (7.72) followed by sample HPC with mean (7.68) then sample BUP with mean (7.64) then sample BAP with mean (7.44). All sample are like moderately. There is no significant different in the flavor of the samples.

In terms of taste sample HPC has the highest value with mean (8.06) followed by sample BUP and URP with mean (7.96) then sample BAP with mean (7.82). Sample HPC is like very much and simple BUP, URP and BAP are like moderately. There is no significant difference in the taste of the samples.

In terms of overall acceptability sample URP has the highest value with mean (8.42) followed by sample HPC with mean (8.38) then sample BUP with mean (8.22) and sample BAP with mean (8.12). All samples are like very much. There is no significant difference in the overall acceptability of the samples.

From the result obtained, it was observed that the difference the sample is not well-cleared because the colour of the sample ranges between 8.20 to 7.98, the appearance ranges between 7.80 to 7.76, the texture ranges between 7.88 to 7.50, the flavor ranges between 7.72 to 7.44, the taste ranges between 8.06 to 7.82 and the overall acceptability ranges between 8.42 to 8.12. With this result obtained there is no significant difference in the samples. Panelists have shown increased demand for the overall acceptability of the dishes and select the samples according to the external characteristics that are assumed to be indicative of the internal quality factors of the dishes. Kader (1985) indicated that

quality factors are appearance, flavor, taste, texture, nutritive value and safety. The texture results of the samples contradict to the findings of (Adams, 2004) which reported that potatoes high in sugar have a poor texture after cooking.

Table 2 shows the proximate composition of the samples, the crude protein in the samples ranged from 1.76% (which is the lowest) in Home style potato chips (HPC) to 2.03% (the highest) in Baked Irish Potato (BAP). The fat content ranged from 1.52% the lowest in Baked Irish Potato to 4.07% in bultured potatoes which is the highest. The Ash content ranged from 0.96% in Baked Irish Potato the lowest value to 1.92% in Home-style Potatoes Chips that has the highest value. The crude fibre ranged from 1.82% to 1.94%. The Buttered Potato (BUP) has the lowest value while the Ultimate Roast Potato (URP) has the highest percentage value of 1.94%. Moisture contents of the samples ranged from 6.28% in Baked Irish Potato (BAP) to 10:11 in Bultured Potato (BUP) which has the highest percentage value. All the percentage value showed significant of ($P<0.05$).

According to Zaccheus (2016), his findings showed that potatoes has negligible amount of fat and viarely rich in protein. Potatoes are healthy food that can be easily consumed, digested and absorbed into the body system Badmus (2014).

Table 3 showes the microbial load count in samples of the dishes after interval of twenty-four (24) hours, forty-eight (48) hours and seventy-two (72) hours and (that is, is one-three days). The lower microbial count of 1.03 x 103cfu/g was obtained in sample B A P (Baked Potato) after one day (24 hour) and the Microbial count rose to 3.23 x 10^5 cfu/g in third day (after 72 hours) with significant ($P<0.05$).

In sample BUP, microbial local count obtained ranged from 1.80 x 10^5 cfu/g after twenty-four (24) hours to 3.62 x 10^5 on the third day that is after 72 hours with significant ($p<0.03$). Microbial load count of 1.67 x 10^3 was obtained after 24hours and rose to 3.44 x 10^5 after 72 hours on third day. In URP, microbial load count obtained was 1.71 x 10^2 (lower anicrobial count) and then increased to 3056 x 10^5 after seventy-two hours (that is on the third day with significant (p z 0.05). Microbes affect and cause food spoilage when such is not well-preserved, quality of potato dishes can be reduced based on the quality and level of preservation for them Zacchariah (2015). Microbes are responsible for the spoilage of food, food contamination can be caused by micro-organisms and this can lead to food poisoning on the consumer FOSKET (2016)

Table 1: Showing the sensory evaluation of various samples of the potato dishes

Sample	Colour	Appearance	Texture	Flavor	Taste	Overall acceptability
BAP	7.98±1.116[a]	7.76±1.222[a]	7.56±1.402[a]	7.44±1.163[a]	7.82±1.304[a]	8.12±1.100[a]
BUP	8.04±1.160[a]	7.76±1.222[a]	7.66±1.287[a]	7.64±1.225[a]	7.96±1.212[a]	8.22±1.016[a]
HPC	8.04±0.947[a]	7.78±1.148[a]	7.88±1.043[a]	7.68±1.039[a]	8.06±1.096[a]	8.38±0.805[a]
URP	8.20±1.088[a]	7.80±1.125[a]	7.50±1.329[a]	7.72±1.499[a]	7.96±1.384[a]	8.42±0.992[a]

Source: Field Survey 2020

Table 2: Showing the proximate composition of the various dishes developed from varieties of potatoes

Samples	Crude protein (%)	Fat (%)	Ash (%)	Crude Fibre (%)	Moisture (%)
BAP	2.03^{a}	1.52^{a}	0.96^{a}	0.93^{a}	6.28^{b}
BUP	1.88^{b}	4.07^{b}	1.06^{b}	1.82^{b}	10.11^{b}
HPC	1.76^{c}	2.77^{c}	1.92^{c}	1.86^{b}	9.09^{a}
URP	1.98^{c}	2.89^{b}	1.87^{b}	1.94^{b}	8.33^{a}

Source: Field Survey, 2020

Table 3: Showing the microbial load count of various dishes developed from varieties of potatoes

Samples	Cfu/g DAY 1	Cfu/g DAY 2	Cfu/g DAY 3
BAP	1.03×10^{3}	2.02×10^{4}	3.23×10^{5}
BUP	1.80×10^{3}	$2.77x\ 10^{4}$	3.62×10^{5}
HPC	1.67×10^{3}	2.63×10^{4}	3.44×10^{5}
URP	1.71×10^{3}	2.73×10^{4}	3.56×10^{5}

Source: Field Survey, 2020

Values are means of triplicates ± standard deviation.

Mean values in the same column with different superscripts are significantly different from each other at $P<0.05$

Sample BAP: Baked Potatoes
Sample BUP: Buttered Potatoes
Sample URP: Homestyle Potatoes Chips
Sample URP: Ultimate Roast Potatoes

5.0 CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The findings of this research as they are seen above is concluded that various dishes can be prepared with other varieties of potatoes available in the local market apart from the well known varieties of potatoes so as to improve the sensory qualities and overall acceptability of the potatoes under examination.

5.2 Recommendation

Based on the findings and condition of the research work, the following recommendation will go a long way in addressing the gap that was observed as well as assisting the food industry:

(i) Since there is no difference in the varieties of potatoes used in this study, the potatoes should be use to prepare the various dishes,
(ii) Yellow sweet potatoes can be considered as the best variety for preparing Ultimate Roast potatoes.
(iii) Potatoes producer and processor can work on the varieties of potatoes used in order to increase their overall acceptability.

REFERENCES

Andre, C. M., Oufir, M., Guignard, C., Hoffman, L., Hausman, J., Evers, D. and Larondelle, Y. (2017). "Antioxidant Pro-filing of Native Andean Potato Tubers (Solanum tuber-sosum L.) Reveals Cultivars with High Levels of β-Carotene, α-Tocopherol, Chlorogenic Acid, and Pet-anin," *Journal of Agricultural and Food Chemistry*, 55, 26, 10839-10849.doi:10.1021/jf0726583

Badmus, C.R. (2014). Impact of Balanced Diet on the Health Status of Diabetic Patients, Journal of Nutrition and Deities NO 101. Vol.27. Pp6-7.

Bamberg, J. and Greenway, G. (2019). Nutritional and economic prospects for expanded potato outlets. Am. J. Potato Res. 1–10.

Brown, C. R. (2015). "Antioxidants in Potato," *American Journal of Potato Research*, 82, 2, 163-172. doi:10.1007/BF02853654

Brown, C. R., Culley, D., Yang, C.P., Durst, R. and Wrolstad, R. (2015). "Variation of Anthocyanin and Carotenoid Contents and Associated Antioxidant Values in Potato Breeding Lines," *Journal of the American Society for Horticultural Science*, 130, 2, 174- 180.

Chun, O. K., Kim, D. O., Smith, N., Schroeder, D. Han, J. T. and Lee, C. Y. (2015). "Daily Consumption of Phenolics and Total Antioxidant Capacity from Fruit and Vegetables in the American Diet," *Journal of the Science of Food and Agriculture*, 85, 10, 1715-1724. doi:10.1002/jsfa.2176

FAOSTA. Food and Agriculture Organization of the United Nations, 2014.

Fontem, D.A., Demo, P. and Njualem, D.K. (2014). "Status of potato production, marketing and utilization in Cameroon," In Proceedings of 9th ISTRC-AB Symposium. Mombasa, Kenya.1-5; 18-25.

Fosket, O. M. (2016) " Impact of Quality Dishes on the Health Status of Hotel's Guests". Journal of Hospitality and Tourism Nos 33 Vol. 61, Pp 7-9.

Habtamu, G., Wahassu, M. and Beneberu, S. (2016). Evaluation of Processing Attributes of Potato (Solanumtuberosum L.) Varieties: Greener Journal of Plant Breeding and Crop Science; 2354-2292.
http://gjournals.org/GJPBCS/Publication/2016/March/HTML/102315148%20Habtamu%20et%20al.htm
http://researcherslinks.com/current-issues/Evaluation-of-Potato-Genotypes-for-Yield-Baked-and-Organoleptic-Quality/14/1/2584/html
http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0001-37652016000300941

Ivanesa G. M. S., Edvane B. S., Ademir J. A., Erilane C. L. M. and Josenilda M. S. (2016). Physico-Chemical and Sensory Evaluation of Potato (Solanum Tuberosum L.) after Irradiation: Anais da Academia Brasileira de Ciências; 88, 2, 1678-2690.

Peabody, E. (2017). "Veggies Reinvented: Breeding Vegetables with More Flavor and Nutrients," *Agricultural Research*, 55, 4-7.

Willcox, J. K. Ash, J. K. and Catignanani, G. L. (2014) "Anti- oxidants and the Prevention of Chronic Disease," Critical Reviews in Food Science and Nutrition, 44, 4, 275-295. doi:10.1080/10408690490468489

Zaccharіah, H.G. (2015) Effects of Microbial Spoilage on Preserved Foods. Journal of food science and Technologhy, No 6 Vol14, pp 9-13.

Zaccheus, N.C. (2016) Nutritional Qualities of potato dishes, Journal of Food Science and Technology NO 33 Vol.12, Pp 11-12.