Egyption Journal
For Specialized Studies
Quarterly Published by Faculty of Specific Education, Ain Shams University

Correspondence:
Editor in Chief
365 Ramses St- Ain Shams University,
Faculty of Specific Education
Tel: 02/26844594
Web Site :
https://ejos.journals.ekb.eg
Email :
egyjournal@sedu.asu.edu.eg

ISBN : 1687 - 6164
ISNN : 4353 - 2682

Evaluation (July 2024) : (7) Point
Arcif Analytics (Oct 2024) : (0.4167)
VOL (13) N (45) P (3)
January 2025

الصفحة الرئيسية

م	القطاع	اسم المجلة	اسم الجهه / الجامعة	ISSN-P	ISSN-O	السنه	نقاط المجله
1	Multidisciplinary عام	المجلة المصرية للدراسات المتخصصة	جامعة عين شمس، كلية التربية النوعية	1687-6164	2682-4353	2024	7

معامل التأثير والاستشهادات المرجعية العربي Arab Citation & Impact Factor
قاعدة البيانات العربية الرقمية Arab Online Database
معرفة e-MAREFA
Arcif Analytics

التاريخ: 2024/10/20

الرقم: L24/0228 ARCIF

سعادة أ. د. رئيس تحرير المجلة المصرية للدراسات المتخصصة المحترم

جامعة عين شمس، كلية التربية النوعية، القاهرة، مصر

تحية طيبة وبعد،،،

يسر **معامل التأثير والاستشهادات المرجعية للمجلات العلمية العربية (ارسيف – ARCIF)**، أحد مبادرات قاعدة بيانات **"معرفة"** للإنتاج والمحتوى العلمي، إعلامكم بأنه قد **أطلق التقرير السنوي التاسع للمجلات للعام 2024**.

ويسرنا تهنئتكم وإعلامكم بأن **المجلة المصرية للدراسات المتخصصة** الصادرة عن **جامعة عين شمس، كلية التربية النوعية، القاهرة، مصر، قد نجحت في تحقيق معايير اعتماد معامل "ارسيف Arcif"** المتوافقة مع المعايير العالمية، والتي يبلغ عددها **(32) معياراً**، وللاطلاع على هذه المعايير يمكنكم الدخول إلى الرابط التالي: http://e-marefa.net/arcif/criteria/

وكان **معامل "ارسيف Arcif " العام** لمجلتكم لسنة 2024 **(0.4167)**.

كما صُنفت مجلتكم في **تخصص العلوم التربوية** من **إجمالي عدد المجلات (127)** على المستوى العربي ضمن الفئة **(Q3)** وهي الفئة الوسطى ، مع العلم أن **متوسط معامل "ارسيف" لهذا التخصص** كان **(0.649)**.

وبإمكانكم الإعلان عن هذه النتيجة سواء على موقعكم الإلكتروني، أو على مواقع التواصل الاجتماعي، وكذلك الإشارة في النسخة الورقية لمجلتكم إلى معامل **"ارسيف Arcif"** الخاص بمجلتكم.

ختاماً، نرجو في حال رغبتكم الحصول على شهادة رسمية إلكترونية خاصة بنجاحكم في معامل " **ارسيف** "، التواصل معنا مشكورين.

وتفضلوا بقبول فائق الاحترام والتقدير

أ.د. سامي الخزندار

رئيس مبادرة معامل التأثير

" ارسيف Arcif"

+962 6 5548228 -9
+ 962 6 55 19 10 7
info@e-marefa.net
www.e-marefa.net
Amman - Jordan
2351 Amman, 11953 Jordan

محتويات العدد

الجزء الثالث :

أولاً : بحوث علمية محكمة باللغة العربية :

ثانياً : بحوث علمية محكمة باللغة الإنجليزية :

Study of the properties of quinoa biscuits for pre-school children as a functional food.

Prof. Ekbal Mahmod Mohamed (1)

Prof. Hanan Abd El-Hamid (2)

Dr. Reda Abdelnaby Mohamed (3)

Shaima Mustafa Farid AbuSuef (4)

(1) Professor Nutrition and Food Sciences Home Economic Dept. Faculty of Specific Education, Ain Shams University
(2) Professor Head Researcher Food Technology Research Institute
(3) Assistant Professor Nutrition and Food Science, Home Economic Dept. Faculty of Specific Education, Ain Shams University
(4) Home Economics Department, Faculty of Specific Education, Ain Shams University

Study of the properties of quinoa biscuits for pre-school children as a functional food.

Prof. Ekbal Mahmod Mohamed Saleh
Prof. Hanan Abd El- Hamid
Dr. Reda Abdelnaby Mohamed
Shaima Mustafa Farid AbuSuef

Abstract

Biscuits are convenient food products that are gaining popularity in both rural and urban areas worldwide. Quinoa (*Chenopodium quinoa* Willd.) was known as the "golden grain", and it is one of the most nutritious grains. This work aims to enrich biscuits with different proportions of quinoa flour (Q.F.) (20, 25 and 30 %), garden cress seeds (5, 7.5 and 10 %) with 25% Q.F., and anise powder (3, 4 and 5 %) with 25% Q.F., and study their effect on biscuits chemical composition, sensory properties, physical properties, and hardness. The results of the study show a significant increase in protein, moisture, fiber, ash, calcium and phosphorus (7.5% garden cress seeds, 25% Q.F.). Biscuits. (3% anise powder, 25% Q.F.)

Keywords: Pre-school children, Biscuits, Quinoa flour, Anise, Garden cress seeds, Nutritional value

ملخص:

العنوان : دراسة خصائص بسكويت الكينوا لأطفال ما قبل المدرسة كغذاء وظيفي

المؤلفون : إقبال محمود صالح ، حنان عبد الحميد حسين ، رضا عبد النبى محمد ، شيماء مصطفى فريد أبو سيف

يعد البسكويت من المنتجات الغذائية المناسبة التي تكتسب شعبية في كل من المناطق الريفية والحضرية في جميع أنحاء العالم. تُعرف الكينوا (Chenopodium quinoa Will.) باسم "الحبوب الذهبية"، حيث تعتبر من الحبوب ذات القيمة الغذائية العالية. يهدف هذا العمل إلى تدعيم البسكويت بنسب مختلفة من دقيق الكينوا (Q.F) (20 و25 و30%) وبذور الرشاد (5 و7.5 و10%) مع25% Q.F ومسحوق اليانسون (3,4و5%) مع 25% Q.F ودراسة تأثيرها على التركيب الكيميائي للبسكويت والخصائص الحسية والفيزيائية والصلابة. أظهرت نتائج الدراسة زيادة معنوية في البروتين، الرطوبة، الألياف، الرماد، الكالسيوم والفوسفور في (7.5% بذور حب الرشاد، 25% Q.F). بسكويت

الكلمات الدالة : أطفال ما قبل المدرسة، البسكويت، دقيق الكينوا، اليانسون، بذور الرشاد، القيمة الغذائية.

1. Introduction

The preschool period (PSC) is a pivotal time for lifestyle interventions to begin the establishment of long-term physical activity and healthy eating habits ***Ling et al., (2016)***. Children learn about their food likes and dislikes through direct contact with foods, such as through tasting, feeling, seeing, and smelling, and also by observing their food environment ***Nicklaus, (2016)*** and ***Johnson, (2016)***.

Quinoa (*Chenopodium quinoa* Willd.) ***Pathan and Siddiqui, (2022)***. and *the Chenopodiaceae* family ***(Filho et al., 2017)*** were known as the "golden grain" ***(Lin et al., 2019)***, where it is one of the most nutritious grains ***(Wu et al., 2023),*** and eaten worldwide as a healthy food (Pathan and Siddiqui, 2022). It is richer in minerals (Ca, K, P, Mg, Fe and Zn) and vitamins (B1, B9, C and E) than conventional cereals ***(Pereira et al., 2019)***. The United Nations declared 2013 the International Year of Quinoa, citing the potentially significant contribution of quinoa in the fight against hunger and malnutrition ***(Scanlin and Lewis., 2017).***

Garden Cress Seeds *(Lepidium sativum)* ***(Almuhayawi et al., 2023)***. It is an annual herbaceous plant that belongs to the plant order *Brassicales* and *the* plant family *Crucifera.* ***(Waheeb and Makki, 2023)***. The seeds comprise a good amount of protein (23 - 25%) and an almost equal amount of fat. The calcium content of seeds is (317 mg/100g). It also contains an admirable amount of iron (17 - 33 mg/100g), zinc (4 - 5 mg/100g), and other minerals and vitamins ***(Jain et al., 2016)***. They are a rich source of dietary fiber, omega-3 fatty acids ***(Doke and Guha, 2014)***.

Anise (*Pimpinella anisum* L., family Apiaceae) is an aromatic annual herb ***Singletary, (2022)*** The seeds are an important source of minerals like calcium, copper, potassium, iron, manganese, magnesium, and zinc. According to **Sun *et al., (2019),*** essential oil content is (1.5–5.0 %), ***Hussain et al., (2014) and Al-Juhaimi, (2014).*** The anethole compounds are responsible

for its characteristic taste. ***Luís et al., (2019),*** and the sweet herbaceous odor ***Hussain et al., (2014)*** and ***Al-Juhaimi, (2014).***

Bakery products are an essential part of the daily diet ***(Šmídová and Rysová, 2022).*** These products were preferred by every age group of consumers as a conventional taste whether it was a healthy food or not ***(Gul et al., 2017).***

Biscuits are convenient food products that are gaining popularity in both rural and urban areas worldwide ***(Di Cairano et al., 2018)***. They are very popular ready-to-eat foods due to their affordable cost and long shelf life. ***Janssen et al., (2021)*** and ***(Zwanka and Buff, 2021)***, which are most widely consumed and easily available in a massive variety of shapes, sizes, tastes, and packs, appeal to all age groups, besides being a very palatable vehicle of nutrition and energy ***Ahmad and Ahmed (2014).***

AIM OF THE STUDY:

The present study is aimed at producing quinoa biscuits enriched with garden cress seeds and anise powder as a functional food rich in energy, protein, calcium, phosphorous, for pre-school children to improve their nutritional status.

MATERIALS AND METHODS

1- Materials

White quinoa grains (*Chenopodium quinoa* Willd), wheat flour (72%), garden cress seeds (*Lepidium sativum* L.), and anise (*Pimpinella* anisum *L*). And all other baking materials: sugar, butter, starch, salt, vanilla, and baking powder were purchased from a spice shop, at a local market. in Menoufia Gov., Egypt.

(A) Preparation of Quinoa Flour.

Quinoa seeds were soaked in water for 2 days with many changes of water, and then the soaked seeds were air-dried for three days at (25 ºC ±2) ***(Dini et al., 2002)***. The air dried seeds were milled in a laboratory to pass through a 60-mesh sieve.

(B) Preparation of Anise Powder

They were washed with water, filtered, dried, purified and finally milled in a laboratory to pass through a 60-mesh sieve.

(C) Preparation of Biscuits

Biscuits were made according to the method described by ***Wade, (1988)***, with some modifications. Biscuits are prepared by partially replacing the wheat flour with quinoa flour, anise powder and garden cress seeds; the formulas are shown in Table (1). All the dry ingredients were mixed together in a dough mixer for 3 minutes, then water was added as required to obtain suitable smooth dough, and the resulted dough was let rest for 5-10 minutes at room temperature, then sheeted to a thickness of about 3-4 mm using a crossbow. The sheeted dough was cut into a round shape using a 55 mm diameter cutter and baked on an aluminium tray in an electric oven at 180°C for 6 minutes. The biscuits were cooled for 30 minutes, packed in polyethylene bags and stored at 4±2°C in the refrigerator.

Table (1) Formula of Biscuits. ***Wade, (1988)***

	Formulas Number (per g).			
Ingredients	1	2	3	4
Wheat Flour (72% extraction) (g)	100	75	67.5	72
Quinoa Flour (g)	-	25	25	25
Garden cress Seeds (g)	-	-	7.5	-
Anise Powder (g)	-	-	-	3
Butter (g)	33	33	33	33
Sugar (g)	36	36	36	36
Salt (g)	0.5	0.5	0.5	0.5
Vanilla (g)	0.25	0.25	0.25	0.25
Baking Powder (g)	3	3	3	3

2-Methods:

2.1 Chemical Composition of Products

Moisture, crude protein, crude fat, ash, and crude fiber contents were determined according to the methods described in the ***AOAC, (2016)***. Available carbohydrate was calculated by

difference. All determinations were performed in triplicate, and the means were reported.

2.2 Physical Properties of biscuits:

Biscuits were evaluated for weight (g), thickness (mm), diameter (mm), density (g/cm3) and spread ratio as described by ***Gaines, (1991)***.

(A) Determination of Thickness:

Thickness was measured using a Vernier calliper, and the average was noted as described by ***Gaines, (1991).***

(B) Determination of Diameter:

Six cookies edge-to-edge, were used for the evaluation and the average was noted as described by ***Gaines, (1991).***

(C) Determination of Weight:

Weight (g) was determined to the nearest 0.1 g as described by ***Gaines, (1991).***

(D) Determination of Spread ratio:

The spread ratio was calculated from the ratio of diameter to thickness using the following equation:

Spread ratio = diameter/thickness, according to ***Gaines, (1991)***.

(E) Determination of water activity (A^w):

Water activity (A^w) was measured at 25 °C using a Decagon Aqualab Meter Series 3TE (Pullman, WA, USA). All samples of storage for sweet and salted biscuits were broken into small pieces immediately before water activity measurement. The measurements were performed in triplicate ***(Shahidi et al., 2008)***.

(F) Texture Profile Analysis (Hardness):

Hardness for biscuits was determined according to ***AACC, (2010)*** by a universal testing machine (Brookfield Engineering Lab. Inc., Middleboro, MA 02346- 1031, USA). A 25-mm

diameter cylindrical probe was used in a TPA at 2 mm/s speed. Hardness was calculated from the TPA graphic in Newton (N). All measurements are done in triplicate.

2.3 Sensory Evaluation of Biscuits

Biscuit samples were organoleptically evaluated for their sensory characteristics according to the method of ***Larmond, (1982)***. The samples were scored for color, flavor (odor and taste), texture and overall acceptability by ten trained panelists from the Food Technology Research Institute. Too were evaluated for thirty children (2-3) years, (4-8) years, and (9-13) years, through illustrations to accept or not, according to ***Resurreccion and a Resurreccion, (1998)***, each face was indicated by two degrees, and thirty public persons from Menoufia Gov., Egypt through grades and sensory attributes like taste, smell, color, texture and overall look.

2.4 Nutritional Value of Biscuits

Calculation of Recommendation Dietary Allowance (RDA):

The percentages of the recommended dietary allowances (% RDA), according to the Food and Nutrition Board, ***Institute of Medicine, and National Academies, (2004)***, provided from 100g of biscuits for children aged 2–3 years, children aged 4–6 years, and children aged 9–13 years.

% RDA=Value of nutrient in the sample ×100 / RDA for the same nutrient.

2.5 Statistical Analysis of Data:

Data obtained from the study were analyzed using the statistical package for social sciences (SPSS16.0 software) and expressed as mean ± standard deviation. One-way analysis of variance (ANOVA) was applied to assess any significant change in study parameters, and Duncan's multiple range test was applied to assess the group's inter-difference. The level of significance was 5%, according to ***(Snedecor and Cochran, 1980)***.

3. RESULTS AND DISCUSSION:

The present study is aimed at producing quinoa biscuits enriched with garden cress seeds and anise powder, as a functional food rich in energy, protein, calcium, phosphorous, and iron for pre-school children to improve their nutritional status.

Chemical Composition of Biscuits.

Table 2: Show the Chemical Composition of Biscuits (Protein, Fat, Carbohydrate, Fiber, Ash, Moisture, and Some Minerals (Calcium, Phosphorus, and Iron).

Nutrients / Formula	Protein (g) Mean ± SD	Fat (g) Mean ± SD	Carbohydrate (g) Mean ± SD	Fiber (g) Mean ± SD	Ash (g) Mean ± SD	Moisture (g) Mean ± SD	Ca (mg/100g) Mean ± SD	Ph (mg/100g) Mean ± SD	Fe (mg/100g Mean ± SD
Control (100% W.F)	6.15 ±0.02d	14.21 ±0.03d	78.12±0.05a	1.80 ±0.05c	1.50± 0.01c	5.25 ±0.04d	34.41± 0.06d	84.87± 0.02d	0.84± 0.02d
25% Quinoa Flour	7.32 ±0.01c	16.89 ±0.05c	73.97±0.09b	2.59 ±0.06b	1.86 ± 0.03b	6.45 ±0.03c	47.06± 0.03c	120.5± 0.03c	3.00 ±0.05c
7.5% Garden Cress Seeds, 25% Q. F	7.71 ±0.03a	17.69 ±0.06b	72.69±0.02d	2.84 ±0.02a	1.96 ± 0.05a	6.69 ±0.05a	73.50± 0.05a	145.87± 0.06a	3.24± 0.03b
3% Anise Powder, 25% Q. F	7.43 ±0.05b	17.95 ±0.02a	72.92±0.03c	2.81 ±0.05a	1.79 ± 0.04a	6.87 ±0.01b	59.98± 0.02b	126.56± 0.09b	3.73± 0.05a

Values are means of three replicates ±SD. The values in the same column followed by the same letter are not significantly different at the 0.05 level.

W. F: wheat flour. Q.F: quinoa flour.

Table (2) shows the chemical composition of biscuits (control (100% W.F.), 25% quinoa flour, 7.5% garden cress seeds with 25% Q.F., and 3% anise powder with 25% Q. F). As for quinoa flour substitution, it resulted in an increase in protein content of 1.17 g/100 g when compared with the control of 6.15 g/100 g., these results agree with those of ***(Vandana and Srivastava, 2020)***, work; who reported that the protein content of the biscuit increased with the supplementation increment. The increase in protein content could be due to the high content of crude protein, ash and crude fat in quinoa, which is generally higher than in common cereals such as wheat. Further fortification with 7.5% garden cress seeds and 3% anise powder resulted in biscuits with a protein content of (7.71 and

7.43g/100g, respectively). As for fat in fortified biscuits with 25% quinoa, it increased by (2.68g/100g), compared with (14.21g/100g), for the unfortified sample. These results agree with those of ***(Shinde et al., 2022)***, who reported that supplementation with quinoa increases the fat content. The fortification with spices resulted in a further increase 3% anise recorded the highest of (17.95g/100g), these results agree with those of Gouda's ***(2019)*** work; who indicated that supplementing bread with different levels of anise (5%, 10% and 15%) gave products with high levels of protein, fat, fiber, ash and minerals. As for carbohydrates, unfortified biscuits (100% wheat flour) recorded the highest value (78.12g/100g), this result agrees with that of ***(El-Sohaimy et al., 2019)***, who recorded carbohydrate content in quinoa bread blends (5% to 30%) as being lower than control due to the higher content of protein, ash, and lipids in quinoa bread. As for fiber, quinoa flour substitution resulted in an increase in fiber content of (0.79g/100g), when compared with the unfortified sample, (1.80g/100g These results agree with those of ***(Cannas et al. (2020)***, who reported a higher amount of fiber in fortified biscuits. The fortification with 7.5% garden cress seeds and 3% anise powder resulted in a further increase, with 7.5% garden cress seeds recording the highest values (2.84 and 2.81g/100g, respectively), this could be explained by the high level of fiber in garden cress seeds (8.21g/100g). Ash in fortified biscuits with 25% quinoa increased by (0.36g/100g), compared with (1.50g/100g), for the unfortified sample. The fortification with 7.5% garden cress seeds and 3% anise powder resulted in further increase 7.5% garden cress seeds recorded the highest value (1.96g/100g), followed by 3% anise powder fortified samples (1.79g/100g). These results agree with those of ***Afify (2022),*** who reported that ash content ranged from 0.40g/100g to 1.30g/100g control and salted biscuits enriched with 10% garden cress seeds. A significant increase in moisture content was observed in fortified biscuit samples compared to the control, where quinoa flour substitution resulted in an increase in moisture content of (1.2g/100g), it is compared with the control

(5.25g/100g), as the fortification with garden cress seeds and anise powder resulted in further increases in moisture (6.69 and 6.87 g/100g, respectively). The result agrees with that of ***(Cannas et al., 2020)***, who reported that, the moisture content of biscuits with quinoa is higher than the control. They referred to this result as the potentially higher water absorbing index of quinoa, since QF has been reported to have a higher fiber content. Calcium in fortified biscuits with 25% quinoa increased by (12.65mg/100g), compared with (34.41mg/100g), for the unfortified sample. This result agrees with that of ***(El Sohaimy et al., 2018)***, who reported that quinoa flour showed a high content of calcium (127mg/kg). The fortification with garden cress seeds and anise powder resulted in further increase in calcium in a fortified biscuits with 7.5% garden cress seeds (73.50mg/100g). This result agrees with that of ***(Afify, 2022)***, work; who reported that calcium content is considerably high in garden cress seeds compared with wheat flour (568.75 and 97.04 mg/100g). Phosphorus in fortified biscuits with 25% quinoa flour increased by (35.63mg/100g), compared with (84.87mg/100g), the unfortified sample. This result agrees with that of ***(El Sohaimy et al., 2018)***, who reported that quinoa is a great source of phosphorus**.** Further fortification with 7.5% garden cress seeds and 3% anise powder resulted in a further increase in phosphorus which reached (145.87mg/100g) in fortified biscuits with 7.5% garden cress seeds. Iron in fortified biscuits with 25% quinoa flour increased by (2.16mg/100g), compared with (0.84mg/100g), for the unfortified sample. result agrees with that of ***(El Sohaimy et al., 2018)***, who reported that quinoa is high in iron. While the fortification with garden cress seeds and anise powder resulted in a further increase in biscuits with 3% anise powder (3.73mg/100g), this result agrees with that of ***(Gouda, 2019)***, who reported that anise content from iron was (2.453mg/100g).

Physical characteristics of Biscuits.

Table 3: Show The Physical characteristics of Biscuits (Diameter, Thickness, Spread Ratio, Weight, Water Activity, and Hardness).

Parameters / Formula	Diameter (mm)	Thickness (mm)	Spread Ratio (D/T)	Weight (g)	Water Activity	Hardness
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Control (100% W.F)	45.15±0.05a	4.31±0.04d	10.48±0.09a	2.02±0.01d	0.211±0.001c	31.73±0.04a
25% Quinoa Flour	39.55±0.05b	4.51±0.01c	8.77 ±0.01b	2.82±0.02c	0.348±0.003c	25.00±0.05c
7.5% Garden Cress Seeds, 25% Q. F	36.86±0.01c	4.65±0.01b	7.93±0.02c	3.33±0.03a	0.503±0.002a	26.53±0.03b
3% Anise Powder, 25% Q. F	36.00±0.20d	4.74±0.01a	7.59±0.03d	3.27±0.03b	0.427±0.073b	27.19±0.06b

Values are means of three replicates ±SD. Values number in the same column followed by the same letter are not significantly different at 0.05 level.

Results in Table (3) show the physical characteristics of biscuits (control (100% W.F), 25% quinoa flour, 7.5% garden cress seeds with 25% Q. F and 3% anise powder with 25% Q. F). The fortified biscuit with (25% quinoa flour, 7.5% garden cress seeds and 3% anise powder), showed lower values for diameter and spread ratio. The diameter of fortified biscuits was (39.55, 36.86 and 36.00 mm, respectively), as compared with unfortified biscuits (45.15mm). These results were similar to those reported by ***(Puri et al., 2020***), who referred to this decrease as the decrease in gluten content of biscuits. As for thickness, fortified biscuits were higher (4.51, 4.65 and 4.74 mm, respectively), as compared with unfortified biscuits (4.31 mm). These results were similar to those reported by ***(Afify, 2022*)**. The spread ratio of the biscuits and crackers should be according to specifications. The spread ratio decreased with the addition of quinoa by (1.71), when compared with the control (10.48). Further additions of 7.5% garden cress seeds and 3% anise powder caused further decreases (2.55 and 2.89, respectively), as compared with the unfortified biscuit value (10.48). The results agree with those of ***(Alshehry, 2019*)**, work. As for the weight of the biscuit with 25% quinoa was slightly higher by (0.8g) than the control (2.02g). These

results were similar to those reported by ***(El-Sohaimy et al., 2019)***, who reported that water absorption significantly increased with the increase in quinoa flour. Differences in weight between the control and blends of quinoa flour might be due to the different protein and fiber contents which result in a difference in water absorption. Further addition of 7.5% garden cress seeds and 3% anise powder resulted in further increases in weight (3.33 and 3.27g, respectively). The water activity value for biscuits with 25% quinoa was slightly higher (0.348) than the control (0.211). The addition of 7.5% garden cress seeds resulted in a further increase in water activity (0.503). These results agree with those of (***Wang et al., 2015***), who reported an increase in water activity by the addition of different levels of quinoa. Also, agree with ***(Afify, 2022)***, who reported a decrease in water activity with the addition of garden cress. As for hardness biscuits, the addition of quinoa flour resulted in biscuits with a reduced hardness by (6.73), as compared with the control biscuits (31.73). The results agree with those of ***(Klunklin and Savage, 2018)***, work; While ***(Sharma et al., 2016)***, explained that the hardness of blended biscuits is normally lower than the hardness of wheat flour biscuits due to the degradation of macromolecules and the low bulk density of flour blends. The hardness increased as a result of the addition of garden cress seeds and anise powder (26.53 and 27.19). This may be due to the high fiber content, these results agree with those of ***(Song et al., 2014)***, who reported that the hardness increased significantly with a higher amount of cinnamon powder.

Sensory Evaluation of Quinoa Flour Biscuits (20, 25 and 30%).

Table 4: Show The Sensory Evaluation of Quinoa Flour Biscuits (20, 25 and 30%).

Parameters / Formula	Color 10 degrees	Taste 10 degrees	Flavor 10 degrees	Texture 10 degrees	Appearance 10 degrees	Overall Acceptability 50 degrees
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Control (100% W.F)	9.72±0.14b	9.13±0.04c	9.02±0.11b	9.94±0.08a	9.24±0.05a	47.05±0.07c
20% Quinoa Flour	9.69±0.04b	9.22±0.08b	9.83±0.05a	9.76±0.14b	9.12±0.07c	47.62±0.09b
25% Quinoa Flour	9.93±0.08a	9.56±0.05a	9.82±0.03a	9.65±0.07c	9.18±0.10b	48.14±0.05a
30% Quinoa Flour	9.63±0.04c	9.06±0.09d	8.82±0.07c	9.65±0.05c	8.97±0.04d	46.13±0.08d

Values are means of three replicates ±SD. Values number in the same column followed by the same letter are not significantly different at 0.05 level.

The average sensory scores for color, taste, flavor, texture, appearance, and overall acceptance characteristics of all biscuits are shown in Table (4). This table show that, there was a significant difference in color, flavor, texture, appearance, and overall acceptance characteristics between the control (100% W.F) and different levels of quinoa flour biscuits (20, 25 and 30%). On the other side, color showed that 25% quinoa flour substitution recorded the highest scores (9.93). The change in color could therefore be because of the Maillard reaction which is an important series of reactions for flavor and color formation in foods and has a primary role in the transformation of raw food material into more appetizing foods with a variety of aromas after thermal processing ***(Arena et al., 2017).*** Scores for taste showed that 25% quinoa flour substitution recorded the highest scores (9.56), while flavor showed that 20% and 25% quinoa flour substitution recorded the highest scores (9.83 and 9.82 respectively) the highest in flavor. Scores for texture showed significant difference between 100% wheat flour and quinoa flour supplemented biscuits. Scores for appearance showed significant difference between 100% wheat flour and quinoa flour biscuit. The results agree with work by ***Makpoul and Ibrahem, (2015)***. Scores for overall acceptability showed that 25% quinoa flour substitution recorded the highest scores (48.14) followed by all the others. Results indicated that adding 25% quinoa flour led to

an increase in the overall acceptability of biscuits compared to adding other concentrations. As a result, 25% quinoa flour substitution was chosen for the rest of the study. The results agree with work by ***Ballester-Sánchez et al., (2019)***, who reported that the replacement of 25% of the wheat flour with whole quinoa flour in making bakery products caused a change in the thermal and pasting properties of the bread doughs, which led to the development of baked products with different physico-chemical and textural characteristics**.** And disagree with ***Watanabe et al., (2014)***, that noted the 15% quinoa cookie was rated low on flavor, taste and overall acceptability compared to the control (not substituted).

Sensory Evaluation of 25% Quinoa Flour Biscuits with Different Levels of Garden Cress Seeds (5, 7.5 and 10%).

Table 5: Show The Sensory Evaluation of 25% Quinoa Flour Biscuits with Different Levels of Garden Cress Seeds (5, 7.5 and 10%).

Parameters Formula	Color 10 degrees Mean ± SD	Taste 10 degrees Mean ± SD	Flavor 10 degrees Mean ± SD	Texture 10 degrees Mean ± SD	Appearance 10 degrees Mean ± SD	Overall Acceptability 50 degrees Mean ± SD
Control (100% W.F)	9.72±0.14b	9.13±0.04d	9.02±0.11b	9.94±0.08a	9.24±0.05a	47.05±0.07c
25% Quinoa Flour	9.93±0.08a	9.56±0.05 b	9.82±0.03a	9.65±0.07b	9.18±0.10b	48.14±0.05a
5% Garden Cress Seeds ,25%Q. F	9.70±0.10b	9.30±0.13c	9.82±0.08a	9.63±0.05b	9.11±0.04c	47.56±0.08b
7.5% Garden Cress Seeds, 25% Q. F	9.97±0.04a	9.63±0.08 a	9.83±0.03a	9.53±0.03c	9.17±0.08b	48.13±0.02a
10% Garden Cress Seeds, 25%Q. F	8.10±0.11d	8.12±0.14e	9.81±0.06a	9.20±0.08d	8.70 ±0.06d	43.93±0.11d

Values are means of three replicates ±SD. Values number in the same column followed by the same letter are not significantly different at 0.05 level.

The average sensory scores for color, taste, flavor, texture, appearance, and overall acceptance characteristics of all biscuits are shown in Table (5). This table show that, there was a significant difference in color, flavor, texture, appearance, and overall acceptance characteristics between the control (100% W.F), and 25% quinoa flour biscuits with different levels of garden cress seeds (5, 7.5 and 10%). On another side regarding the color, biscuits fortified with 25% quinoa and 7.5% garden

cress seeds scored the highest values (9.93 and 9.97, respectively) than other samples with no significant difference between color values of 100% wheat flour and samples with 5% garden cress seeds, color changes might be due to color of the seed which was reddish brown ***Gaikwad et al., (2021)***. As for taste, 7.5% garden cress seeds scored the highest value (9.56) compared to all other samples, with a significant difference between all samples. Regarding flavor, fortified biscuits scored the highest values compared with unfortified biscuits (9.02). Regarding texture, unfortified biscuits scored the highest values (9.94) compared with fortified biscuits, with 25% quinoa and 5% garden cress seeds recording the same values. Regarding appearance, biscuits unfortified scored the highest values (9.24) compared with fortified biscuit with 25% quinoa and 7.5% garden cress seeds recorded the same values. Regarding the overall acceptability, biscuits fortified with (25% quinoa and 7.5% garden cress seeds) scored the highest values (48.14 and 48.13 respectively) followed by all the others. As a result, 25% quinoa and 7.5% garden cress seeds substitution were chosen for the rest of the study. These results agree with work by ***Gaikwad et al., (2021)***, who reported that garden cress seed was chosen to enhance the nutrient composition of cookies and biscuits in terms of dietary fiber and other nutrients. And the study of ***Jain et al., (2016)***, that noted substitution of garden cress seed powder at least up to 10 percent level can be made for most of the supplementary food except biscuits (7.5%).

Sensory Evaluation of 25% Quinoa Flour Biscuits with Different Levels of Anise Powder.

Table 6: Show The Sensory Evaluation of 25% Quinoa Flour Biscuits with Different Levels of Anise Powder.

Parameters / Formula	Color 10 degrees	Taste 10 degrees	Flavor 10 degrees	Texture 10 degrees	Appearance 10 degrees	Overall Acceptability 50 degrees
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Control (100% W.F)	9.72±0.14b	9.13±0.04c	9.02±0.11b	9.94±0.08a	9.24±0.05a	47.05±0.07c
25% Quinoa Flour	9.63±0.09c	9.06±0.10d	8.82±0.14c	9.65±0.08c	8.97±0.02d	46.13±0.05d
3% Anise Powder, 25% Q. F	9.69±0.10b	9.22±0.13b	9.83±0.08a	9.76±0.05b	9.12±0.04c	47.62±0.08b
4% Anise Powder, 25%Q. F	9.93±0.04a	9.56±0.08a	9.82±0.03a	9.65±0.03c	9.18±0.08b	48.14±0.02a
5% Anise Powder, 25%Q. F	8.13±0.11d	8.02±0.14e	9.81±0.06a	9.28±0.08d	8.74±0.06e	43.97±0.11e

Values are means of three replicates ±SD. Values number in the same column followed by the same letter are not significantly different at 0.05 level.

The average sensory scores for color, taste, flavor, texture, appearance, and overall acceptance characteristics of all biscuits are shown in table (6). This table shows that, there was a significant difference in color, flavor, texture, appearance, and overall acceptance characteristics between the control (100% W.F), and 25% quinoa flour biscuits with different levels of anise powder (3, 4 and 5%). On another side regarding the color, biscuits fortified with 4% anise scored the highest values (9.93) than all other samples. As for taste biscuits fortified with 4% anise scored the highest values (9.93) than all other samples. Regarding flavor, samples with 3, 4 and 5% anise were significantly higher (9.83, 9.82 and 9.81, respectively) than 100% wheat flour and samples with 25% quinoa flour, therefore, the higher flavor of anise could be because it is an aromatic plant ***George, (2012)***. Texture scores showed that biscuits unfortified scored the highest values (9.94) compared with biscuits fortified with 25% quinoa flour and 4% anise which recorded the same values. Concerning the general appearance of biscuits, results showed that biscuits unfortified scored the highest values (9.24) compared with biscuits fortified. Regarding the overall acceptability, 4% anise recorded the highest value (48.14) followed by all the others. As a result, 4% anise substitution was chosen for the rest of the study.

Sensory Evaluation of Biscuits.

Table 7: Show The Sensory Evaluation of Biscuits for Children and Adults.

Parameters		Color 10 degrees	Taste 10 degrees	Flavor 10 degrees	Texture 10 degrees	Appearance 10 degrees	Overall Acceptability 50 degrees
Formula	age group	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Control (100% W.F)	Children (2-13)	8.70 ±0.675a	8.70 ±0.675b	9.40 ±0.699 a	9.90 ±0.316 a	9.40 ±0.516a	46.30 ±1.418 a
	Adults	9.00 ±0.000a	8.40 ±0.516a	8.60 ±0.516a	9.00 ±0.000a	10.00±0.000a	45.00 ±0.943a
25% Quinoa Flour	Children (2-13)	7.80 ±0.919b	7.10 ±0.876c	7.80 ±0.789b	8.30 ±0.483c	8.40 ±0.516c	39.40 ±2.271c
	Adults	8.00 ±0.000b	9.00 ±0.471a	9.00 ±0.667a	8.90 ±0.316a	9.30 ±0.483b	44.20 ±1.476ab
7.5% Garden Cress seeds, 25% Q. F	Children (2-13)	9.10 ±0.316a	8.90 ±0.738b	8.40 ±0.699b	8.80 ±0.632b	8.90 ±0.316b	44.10 ±1.524b
	Adults	7.40 ±0.966c	6.20 ±1.814b	7.80 ±0.632b	7.40 ±0.699b	8.00 ±0.000d	36.80 ±3.458c
3% Anise powder, 25% Q. F	Children (2-13)	9.30 ±0.483a	9.70 ±0.675a	9.30 ±0.483a	9.20 ±0.632b	9.20 ±0.632ab	46.70 ±1.567a
	Adults	8.30 ±0.483b	8.60 ±0.516a	8.00 ±0.471b	8.90 ±0.316a	9.00 ±0.000c	42.80 ±0.919b

Values are means of three replicates ±SD. Values number in the same column followed by the same letter are not significantly different at 0.05 level.

W. F: wheat flour. Q.F: quinoa flour.

Table (7) shows color, taste, flavor, texture, appearance, and the overall acceptability scores for biscuit samples added to quinoa flour, garden cress seeds, and anise powder for children and adults. Adults were chosen for sensory evaluation because mothers would not accept that their children eat anything without their consent. Therefore, the adult and child categories were chosen for sensory evaluation, and the adolescent category was ignored. As seen in the table there was a significant difference between the three substituted samples for children and adults in color, taste, flavor, texture, appearance, and overall acceptability. The results showed that the acceptance of children was not equal to that of adults in the sensory test of the product. When adding quinoa flour (25% Q. F), the results for adults were (44.20) degrees, while in children, its score was lower (39.40) degrees, these results agree with ***(Ayseli et al., 2020)***, who explained that the acceptability of products like quinoa can differ between age groups. But when adding garden cress seeds (7.5% garden cress seeds & 25% Q. F), the results for adults were (36.80) degrees, while in children, the score was higher (44.10) degrees. These results agree with ***Shanshan et al., (2023)***, who discovered that

sensory evaluation of products such as cupcakes, biscuits, and mini pizzas was deemed acceptable when they were enhanced with small amounts of garden cress seeds. When adding anise powder (3% anise powder & 25% Q. F), the results for adults were (42.80) degrees, while in children, its score was higher (46.70) degrees, this may be due to the aromatic flavor (anise) ***George, (2012)***.

Nutritional Evaluation of Biscuits:

The percentages of the recommended dietary allowances (% RDA) that provided from 100g of biscuits, for children (both males and females) 4-6 years.

Table 8: Show The percentages of the recommended dietary allowances (% RDA) that provided from 100g of biscuits, for children (both males and females) 4-6 years.

Age group	Male 4-6 years							Female 4-6 years				
RDA Formula	P 19 g/d	En 1400 Kcal/d	Fiber 20 g/d	Ca 1000 mg/d	Ph 500 mg/d	Fe 10 mg/d	P 19 g/d	En 1200 Kcal/ d	Fiber 17 g/d	Ca 1000 mg/d	Ph 500 mg/d	Fe 10 mg/d
Control (100% W.F) biscuits	32.37	33.21	9	3.44	16.97	8.40	32.37	38.75	10.59	3.44	16.97	8.40
25% Quinoa Flour	38.53	34.08	12.95	4.71	24.10	30.00	38.53	39.76	15.24	4.71	24.10	30.00
7.5% Garden Cress Seeds, 25% Q. F	40.58	34.34	14.2	7.35	29.17	32.40	40.58	40.07	16.71	7.35	29.17	32.40
3% Anise Powder, 25%Q. F	39.11	34.496	14.05	5.998	25.31	37.30	39.11	40.25	16.53	5.998	25.31	37.30

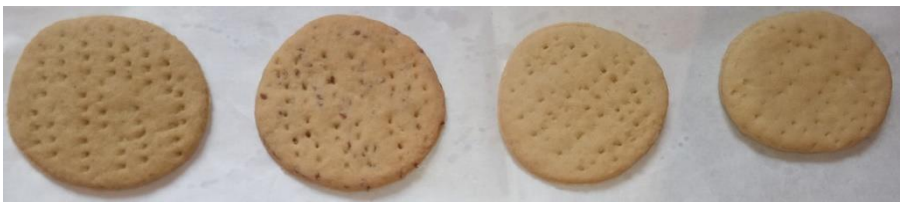
P: protein. En: energy.

Table -8-, presents % RDA provided from 100g of biscuits, for children (both males and females) 4-6 years, according to ***Dietary Guidelines for Americans, (2020-2025)***, it could be observed that supplementation of biscuits with 25% quinoa flour covers up to (38.53%) of protein requirement, for (both males and females), (34.08%) for males and (39.76%), for females of energy requirement, (12.95%), for males and (15.24%), for females of fiber requirement. Also, the quinoa biscuits provided (4.71%) of calcium, (24.10%) of phosphorus and (30.00%) of iron, for both males and females. The addition of 7.5% garden cress seeds provided as additional increase in the protein to (40.58%), for

both males and females, and increase in the fiber to (14.2 and 16.71%), for both males and females, respectively, calcium and phosphorus provided by biscuits were (7.35 and (29.17%), respectively for (both males and females). The addition of anise powder provided as additional increase in the energy to (34.496 and 40.25%) for both males and females, respectively, and increase iron to (37.30%) for (both males and females) 4-6 years. It could be noticed that consuming sesame crackers could provide children with part of their daily requirements of energy, protein, dietary fiber, calcium, iron and Phosphorus.

4: CONCLUSION:

The findings of the study revealed that fortification of (7.5 Garden Cress Seeds, 25% Q. F), reported a good product of quinoa biscuits, where recorded high values of protein, fiber, ash, moisture, calcium and phosphorus, and provided pre-school children with a part of their nutritional dietary daily allowances with 34.08%, energy, 38.53%, protein, 4.71%, calcium, 24.10%, phosphorus and 30.00%, iron.



A B C D

A: 3% anise powder, 25% Q. F.

B: 7.5 garden cress seeds, 25% Q. F.

C: 25% quinoa flour.

D: control (100% W.F).

REFERENCE

1. **AACC. (2010).** Approved Methods of American Association of Cereal Chemists. St. Paul, USA: American Association of Cereal Chemists.
2. **Afify, H., (2022)**. Use of Garden Cress (Lepidium sativum L.) Seeds to Produce some Healthy Bakery Products. Asian Food Science Journal, 12-21.
3. **Ahmad, S., & Ahmed, M. (2014).** A review on biscuit, a largest consumed processed product in India, its fortification and nutritional improvement. *International Journal of Science Inventions Today*, *3*(2), 169-186.
4. **Al-Juhaimi, F. Y. (2014).** Citrus fruits by-products as sources of bioactive compounds with antioxidant potential. *Pak. J. Bot*, *46*(4), 1459-1462.
5. **Almuhayawi, M. S., Alruhaili, M. H., Gattan, H. S., Alharbi, M. T., Nagshabandi, M. K., Al Jaouni, S. K., ... & Elnosary, M. E. (2023).** In silico molecular modeling of cold pressed garden cress (Lepidium sativum L.) seed oil toward the binding pocket of antimicrobial resistance Staphylococcus aureus DNA-gyrase complexes. *European Review for Medical & Pharmacological Sciences*, *27*(4).
6. **Alshehry, G.A. (2019).** Technological and sensory characteristics of biscuits fortified with garden cress (Lepidium sativum) seeds. Life Sci. J.; 16(8):28-35.
7. **AOAC. (2016).** "Official Methods of Analysis" Association Official Analytical Chemists of the 20th Ed. International, Gaithersburg, MD, USA.
8. **Arena, S.; Renzone, G.; D'Ambrosio, C.; Salzano, A. M.; Scaloni, A**. Dairy Products and the Maillard Reaction: A Promising Future for Extensive Food Characterization by Integrated Proteomics Studies. Food Chem. 2017, 219, 477–489. DOI: 10.1016/j.foodchem.2016.09.165.
9. **Ayseli, M. T., Yilmaz, M. T., Cebi, N., Sagdic, O., Ozmen, D., & Capanoglu, E. (2020).** Physicochemical, rheological, molecular, thermal and sensory evaluation of newly developed complementary infant (6–24 months old) foods prepared with quinoa (Chenopodium quinoa Willd.) flour. *Food Chemistry*, *315*, 126208.
10. **Ballester-Sánchez, J., Yalcin, E., Fernández-Espinar, M. T., & Haros, C. M. (2019).** Rheological and thermal properties of royal quinoa and wheat flour blends for breadmaking. *European Food Research and Technology*, *245*, 1571-1582.

11. **Cannas, M., Pulina, S., Conte, P., Del Caro, A., Urgeghe, P.P., Piga, A. and Fadda, C., (2020).** Effect of substitution of rice flour with Quinoa flour on the chemical-physical, nutritional, volatile and sensory parameters of gluten-free ladyfinger biscuits. Foods, 9(6), p.808.
12. **Di Cairano, M., Galgano, F., Tolve, R., Caruso, M. C., & Condelli, N. (2018).** Focus on gluten free biscuits: Ingredients and issues. *Trends in Food Science & Technology*, *81*, 203-212.
13. **Dietary Guidelines for Americans, (2020-2025) Appendix 1.**
14. **Dini I; Tenore GC and Dini, A (2002):** Oleanane saponins in ‘‘kancolla’’, a sweet variety of Chenopodium quinoa. Journal of Natural Products, 65: 1023–1026.
15. **Doke, S., & Guha, M. (2014).** Garden cress (Lepidium sativum L.) seed-an important medicinal source: A. *Cellulose*, *9*(0.03).
16. **El Sohaimy, S. A., Mohamed, S. E., Shehata, M. G., Mehany, T., & Zaitoun, M. A. (2018).** Compositional analysis and functional characteristics of quinoa flour. *Annual Research & Review in Biology*, 1-11.
17. **El-Sohaimy, S. A., Shehata, M. G., Mehany, T., & Zeitoun, M. A. (2019).** Nutritional, physicochemical, and sensorial evaluation of flat bread supplemented with quinoa flour. *International journal of food science*, *2019*.
18. **Filho, A. M. M., Pirozi, M. R., Borges, J. T. D. S., Pinheiro Sant'Ana, H. M., Chaves, J. B. P., & Coimbra, J. S. D. R. (2017).** Quinoa: Nutritional, functional, and antinutritional aspects. *Critical reviews in food science and nutrition*, *57*(8), 1618-1630.
19. **Food and Nutrition Board**, Institute of Medicine, & National Academies, (2004). National Center for Biotechnology Information, Available on http//www. ncbi.nlm.nih.gov.
20. **Gaikwad, V. G., Chavan, U. D., Godase, S. N., & Kotecha, P. M. (2021).** Studies on nutritional quality of garden cress seed cookies. IJCS, 9(1), 1603-1609.
21. **Gaines, C. S. (1991).** Instrument measurement of the hardness of cookies and crackers. *Cereal Foods World*, *36*(12), 989-996.
22. **George, C. K. (2012). 24 - Star anise. In K. V. Peter (Ed.),** Handbook of herbs and spices (Second ed., pp. 487–503). Cambridge, England: Woodhead Publishing.1264PATRAET AL.
23. **Gouda, T. M. (2019).** Study The Storage Quality of Supplemented Bread with Different Levels of Anise Powder. *Journal of Home Economics*, *29*(1).
24. **Gul, H., Kart, F. M., Gul, M., & AKPINAR, M. G. (2017).** BAKERY PRODUCTS CONSUMPTION AND

CONSUMERS'AWARENESS IN URBAN AREAS OF ISPARTA CITY, TURKEY. *Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development*, *17*(2).

25. **Hussain, J., Rehman, N., Shinwari, Z. K., Khan, A. L., Al-Harrasi, A., Ali, L., & Mabood, F. (2014).** Preliminary comparative analysis of four botanicals used in the traditional medicines of Pakistan. *Pak. J. Bot*, *46*(4), 1403-1407.
26. **Jain, T., Grover, K., & Grewal, I. S. (2016).** Development and sensory evaluation of ready to eat supplementary food using garden cress (Lepidium sativum) seeds. *Journal of Applied and Natural Science*, *8*(3), 1501-1506.
27. **Janssen, M., Chang, B. P., Hristov, H., Pravst, I., Profeta, A., & Millard, J. (2021).** Changes in food consumption during the COVID-19 pandemic: analysis of consumer survey data from the first lockdown period in Denmark, Germany, and Slovenia. *Frontiers in nutrition*, 60.
28. **Johnson, S. L. (2016).** Developmental and environmental influences on young children's vegetable preferences and consumption. *Advances in Nutrition*, *7*(1), 220S-231S.
29. **Klunklin, W., & Savage, G. (2018).** Effect of substituting purple rice flour for wheat flour on physicochemical characteristics, in vitro digestibility, and sensory evaluation of biscuits. *Journal of food quality*, *2018*.
30. **Larmond E. (1982)** Laboratory methods of sensory evaluation of food. Research branch. Canada Department of Agriculture Publications.
31. **Lin, M., Han, P., Li, Y., Wang, W., Lai, D., & Zhou, L. (2019).** Quinoa secondary metabolites and their biological activities or functions. *Molecules*, *24*(13), 2512.
32. **Ling, J., Robbins, L. B., & Wen, F. (2016).** Interventions to prevent and manage overweight or obesity in preschool children: A systematic review. *International journal of nursing studies*, *53*, 270-289.
33. **Luís, Â., Sousa, S., Wackerlig, J., Dobusch, D., Duarte, A. P., Pereira, L., & Domingues, F. (2019).** Star anise (Illicium verum Hook. f.) essential oil: Antioxidant properties and antibacterial activity against Acinetobacter baumannii. *Flavour and Fragrance Journal*, *34*(4), 260-270.
34. **Makpoul, K. R., & Ibrahem, A. A. (2015).** Improving biscuit nutritional value using quinoa flour. *Journal of Food and Dairy Sciences*, *6*(12), 771-780.

35. **Nicklaus, S. (2016).** The role of food experiences during early childhood in food pleasure learning. *Appetite*, *104*, 3-9.
36. **Pathan, S., & Siddiqui, R. A. (2022).** Nutritional composition and bioactive components in quinoa (Chenopodium quinoa Willd.) greens: A review. *Nutrients*, *14*(3), 558.
37. **Pereira, E., Encina-Zelada, C., Barros, L., Gonzales-Barron, U., Cadavez, V., & Ferreira, I. C. (2019).** Chemical and nutritional characterization of Chenopodium quinoa Willd (quinoa) grains: A good alternative to nutritious food. Food chemistry, 280, 110-114.
38. **Puri, S., Sarao, L.K., Kaur, K. and Talwar, A., (2020).** Nutritional and quality analysis of quinoa seed flour fortified wheat biscuits. Asian Pacific Journal of Health Sciences, 7(1), 48-52.
39. **Resurreccion, A. V., & a Resurreccion, A. V. (1998).** Consumer sensory testing for product development.
40. **Scanlin, L., & Lewis, K. A. (2017).** Quinoa as a sustainable protein source: Production, nutrition, and processing. In *Sustainable protein sources* (pp. 223-238). Academic Press.
41. **Shahidi, F., Sedaghat, N., Farhoosh, R., & Mousavi-Nik, H. (2008).** Shelf-life determination of saffron stigma: Water activity and temperature studies. *World Applied Sciences Journal, 5 (2): 132-136.*
42. **Shanshan, N. M., Sahloul, O. T., & Nour, A. E. (2023).** Effect of adding chia and garden cress seeds on some baked products. *المجلة العلمية لكلية التربية النوعية جامعة دمياط*, 1-21.
43. **Sharma, S., Saxena, D. C., & Riar, C. S. (2016).** Nutritional, sensory and in-vitro antioxidant characteristics of gluten free cookies prepared from flour blends of minor millets. *Journal of Cereal Science*, *72*, 153-161.
44. **Shinde, D.B., Prasad, S.G., David, J. and Prasad, M., (2022**). Physico-chemical analysis of quinoa flour cookies.
45. **Singletary, K. W. (2022).** Anise: Potential Health Benefits. *Nutrition Today*, *57*(2), 96-109.
46. **Šmídová, Z., & Rysová, J. (2022).** Gluten-free bread and bakery products technology. *Foods*, *11*(3), 480.
47. **Snedecor, G. W., & Cochran, W. G. (1980).** Statistical methods Iowa state university press, ames. *Statistical methods, 7th ed..The Iowa State University Press, Ames*.
48. **Song, J. H., Lim, J. A., & Lee, J. H. (2014).** Quality and antioxidant properties of cookies supplemented with cinnamon powder.
49. **Sun, W., Shahrajabian, M. H., & Cheng, Q. (2019).** Anise (Pimpinella anisum L.), a dominant spice and traditional medicinal herb for both food and medicinal purposes. *Cogent Biology*, *5*(1), 1673688.

50. **Vandana and Srivastava, S., (2020)**. Formulation of quinoa (Chenopodium quinoa) biscuits and evaluation of its physical, textural, sensory and nutritional quality. Journal of Pharmacognosy and Phytochemistry, 9(5), pp.143-147.
51. **Wade, P. (1988).** *Biscuits, cookies, and crackers. Elsevier applied science, 1:102-114.*
52. **Waheeb, M. Q., & Makki, M. A. (2023).** Using of lepidium sativum L. extract, as antimicrobial and anti-mosquito.
53. **Wang, S., Opassathavorn, A., & Zhu, F. (2015).** Influence of Quinoa Flour on Quality Characteristics of Cookie, Bread and Chinese Steamed Bread. Journal of Texture Studies, 46(4), 281-292.
54. **Watanabe, K., Kawanishi-Asaoka, M., Myojin, C., Awata, S., Ofusa, K., & Kodama, K. (2014).** Amino acid composition, oxidative stability, and consumer acceptance of cookies made with quinoa flour. *Food Science and Technology Research*, *20*(3), 687-691.
55. **Wu, Q., Mousa, M. A., Al-Qurashi, A. D., Ibrahim, O. H., Abo-Elyousr, K. A., Rausch, K., ... & Kamruzzaman, M. (2023).** Global calibration for non-targeted fraud detection in quinoa flour using portable hyperspectral imaging and chemometrics. *Current Research in Food Science*, *6*, 100483.
56. **Zwanka, R. J., & Buff, C. (2021).** COVID-19 generation: A conceptual **framework** of the consumer behavioral shifts to be caused by the COVID-19 pandemic. *Journal of International Consumer Marketing*, *33*(1), 58-67.

المجلة المصرية للدراسات المتخصصة

دورية فصلية علمية محكمة – تصدرها كلية التربية النوعية – جامعة عين شمس

المجلة المصرية للدراسات المتخصصة
Egyptian Journal for Specialized Studies

المراسلات :

ترسل المراسلات باسم الأستاذ الدكتور/ رئيس التحرير، على العنوان التالى

٣٦٥ ش رمسيس – كلية التربية النوعية – جامعة عين شمس ت/ ٠٢/٢٦٨٤٤٥٩٤

الموقع الرسمي:
https://ejos.journals.ekb.eg

البريد الإلكتروني:
egyjournal@sedu.asu.edu.eg

الترقيم الدولي الموحد للطباعة : 6164 - 1687

الترقيم الدولي الموحد الإلكتروني : 2682 - 4353

تقييم المجلة (يونيو ٢٠٢٤) : (7) نقاط

معامل ارسيف Arcif (أكتوبر ٢٠٢٤) : (0.4167)

المجلد (١٣) . العدد (٤٥) . الجزء الثالث

يناير ٢٠٢٥