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MORPHO-PHYTOCHEMICAL COMPOSITION OF SESAME (Sesamum indicum L.) VARIETIES GROWN IN LAFIA, NASARAWA STATE, NIGERIA

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ABSTRACT
The study, Morpho-phytochemical composition of sesame (*Sesamum indicum*) varieties grown in Lafia, Nasarawa state-Nigeria. The experiment was conducted at the Botanical Garden of the Federal University of Lafia, Nasarawa State. Sesame varieties were obtained from National Cereal Research Institute Baddegi, Niger State. The varieties obtained include: GUJ BLACK, CHI001, and NCRIBEN 04E, NCRIBEN 05E and E8. The experiment was laid out in a randomized complete block design with three replications. Data were collected on the basis of Number of days for germination, Number of days to flowering, Plant height at flowering, Number of leaves per plant, Number of branches per plant, Number of branches at 50% flowering, Plant height at maturity, Number of pods per plant, Number of seeds per plant and 1000 seed weight. 30 g of sesame seeds from each varieties were grounded and analyzed for six proximate traits. Data were recorded for crude protein, crude fat/oil, fibre, mineral ash, moisture content and carbohydrate content. All proximate analyses were done according to Official methods of Associations of Analytical Chemist (AOAC). Data collected were subjected to ANOVA $P \leq 0.5$. The varieties GUJBLACK and E8 performed very well in most of the morphological characterization such as days to germination, germination percentage, number of leaves, plant height, number of branches and 100 seed weight. Phytochemical composition of different varieties revealed that the variety GUJBLACK has the highest concentration of alkaloid, flavonoid, phenols, glycosides and saponin. The least varieties performance were observed in NCRIBEN 05E and NCRIBEN 04E.

Keywords: Morpho-phytochemical, composition, sesame

INTRODUCTION
Sesame (*Sesamum indicum* L.) is an ancient oilseed crop cultivated globally in both tropical and temperate regions, with a history dating back over 4,000 years (Bedigian, 2010). Sesame was historically prized in Babylon and Assyria over 4000 years ago, highlighting its significance and value in ancient civilizations (Akhila *et al*., 2015). Sesame, also known as gingerly oil, remains a significant source of edible oil in India, culturally significant since the Vedic period. Internationally recognized as "sesame," it is referred to as "benniseed" in West Africa, "simsim" in East Africa, and "Till" in India. Local names vary within Nigeria, such as "ridi" in Northern States and "Igogo," "Ocha," and "Ishwa" among certain ethnic groups in Benue State (Adegnwa *et al*., 2012).

Sesame is a significant crop farmed in almost all nations in West and Central Africa, with Nigeria and Burkina Faso being the top producers. It serves as an alternative cash crop that generates income for smallholders, especially women (Jakusko, 2013). Sesame (*Sesamum indicum* L.) is an ancient oilseed crop cultivated globally, prized for its edible oil and cultural significance, with local names varying across regions (Jakusko, 2013). Sesame is a significant crop in West and Central Africa, particularly in Nigeria and Burkina Faso, serving as a cash crop for smallholders, especially women (Bedigian, 2010). The global demand for sesame seeds is increasing rapidly, with West African sesame seeds being valued for their pesticide-free production, making it a significant agricultural export commodity (Adegnwa, 2012).

Natural sesame oil, derived from high-quality seeds, has a pleasant flavor and requires minimal processing, making it a popular choice for consumption (Bedigian, 2010). Sesame has been cultivated since ancient times for its ease of extraction, stability, and drought resistance and its medicinal properties have been well-documented for historical and contemporary use (Bedigian, 2010). Sesame seeds are utilized in various forms, including whole or decorticated, in sweets, baked goods, or milled for oil extraction, and are valued for their therapeutic compounds (Gul *et al*., 2024). Sesame is a significant source of mono-unsaturated fatty acids, offering health benefits such as lowering Low-Density Lipoprotein (LDL) cholesterol and increasing High-Density Lipoprotein HDL cholesterol, and is rich in essential amino acids and minerals like calcium, iron, zinc, and vitamins (Gul *et al*., 2024). Sesame seeds are recognized for their potential anticancer properties and are used widely in culinary applications, making them a valuable crop for both nutritional and economic benefits (Gul *et al*., 2024). Sesame seed demand is rising quickly all over the world, and West African sesame seed is particularly valued because it is produced largely without

pesticides. Sesame has grown to be a significant agricultural export good, affecting millions of farm households (Adegnwa, 2012).

Sesame cultivation has recently increased due to its drought resistance and easy growing circumstances, but most crucially due to farmers' need to diversify their sources of income (Gul *et al*., 2024). Sesame is one of the major agricultural exports in Nigeria. It is widely neglected despite its potential to contribute to the country's food security and economy. Understanding the morphological, proximate, and phytochemical properties of sesame will enhance its cultivation, processing, and utilization. The study will provide valuable information for breeders, nutritionists, and industrialists who rely on sesame for various purposes.

MATERIALS AND METHODS

Study area

The study was carried out at the Department of Plant Science and Biotechnology Botanical Garden, of the Federal University of Lafia, Nasarawa State. Sesame varieties were collected from National Cereal Research Institute (NCRI) Badeggi, Niger State.

The experiment was carried out during the 2024 cropping season (July). The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replications. The plots were measured 2 x 2 m with intra row spacing of 1 m. Healthy sesame seeds were sown with a seed rate of 20 – 25 kg/ha and spacing of 20 x 25 cm. Data were collected on the basis of Number of days for germination, Number of days to flowering, Plant height at flowering, Number of leaves per plant, Number of branches per plant, Number of branches at 50% flowering, Plant height at maturity, Number of pods per plant, Number of seeds per plant and 1000 seed weight.

Proximate components

Proximate components studied, 30 g of sesame seeds from each variety were grounded and analyzed for six proximate traits. Data were recorded for crude protein, crude fat/oil, fibre, mineral ash, moisture content and carbohydrate content. All proximate analyses were done according to official methods of Associations of Analytical Chemist (AOAC, 1995).

Statistical analysis

Data collected were subjected to ANOVA ($P \leq 0.5$), using Genstat version 17 software.

RESULT AND DISCUSSION

Number of days to germination

The result of Analysis of Variance (ANOVA) of the data collected revealed that the variety CHI001 has the least number of days to germination (3.00) while the variety E8 has the highest number of days to germination (4.00) (Table 1). Number of days to germination was recorded by Vanishree *et al*. (2022).

Germination percentage

The result also showed that the variety CHI001 has the least germination percentage (0.33%) while the variety GUJBLACK has the highest germination percentage (21.99%) (Table 1). Germination percentage was observed by earlier study carryout by Vanishree *et al*. (2022).

The number of leaves at 50% flowering

The result also showed that the variety E8 has the least number of leaves at 50% flowering (25.00) while the variety NCRIBEN 04E has the highest number of leaves at 50% flowering (57.00) (Table 1). The number of leaves was earlier recorded by a work done by Vanishree *et al*. (2022).

Table 1: Number of days to germination, germination percentage and number of leaves/plant in five varieties of sesame

Varieties (V)	No. of days to germination	Germination percentage	No. of Leavers at 50% Flowering
NCRIBEN 04E	3.67	15.89	57.00
NCRIBEN 05E	3.33	21.11	33.33
GUJ BLACK	3.33	21.99	32.00
CH 1001	3.00	0.33	33.00
E8	4.00	15.99	25.00
Mean	3.47	15.06	36.06
SE±	5.71	36.06	0.81
F -LSD (0.05)	1.90	2.02	0.06
C.V (%)	11.01	49.6	14.21

F-LSD= Least Significant Different at 0.05 level of probability; SE=standard error; C.V = Coefficient of Variation %

Table 2: Plant height flowering, days to flowering and number of flower/plant in five varieties of sesame

Varieties (V)	Plant height at 50% flowering (cm)	No. of days to 50% flowering	Number of flower per plant
NCRIBEN 04E	46.89	51.00	13.00
NCRIBEN 05E	44.00	51.00	20.33
GUJ BLACK	49.87	39.00	17.67
CH 1001	20.00	51.00	2.00
E8	35.60	61.00	3.00
Mean	39.27	50.60	16.27
SE±	0.67	0.55	1.56
F-LSD (0.05)	0.05	0.80	1.43
C.V (%)	46.25	48.43	12.77

F-LSD= Least Significant Different at 0.05 level of probability; SE=standard error; C.V = Coefficient of Variations

Plant height at 50% flowering

The result for plant height at 50% flowering revealed that sesame variety CHI001 has the least plant height at 50% flowering (20.00) comparing to the other four varieties while the variety GUJBLACK has the highest plant height at 50% flowering (49.87) (Table 2). The plant height was earlier reported and was consistent with the work carried out by Alhassan *et al*. (2025).

Number of days to 50% flowering

The result also showed that variety GUJBLACK has the least number of days to 50% flowering (39.00) comparing to the other four varieties while the variety E8 has the highest number of days to 50% flowering (61.00) (Table 2). The number of days to flowering was consistent with the work carried out by Alhassan *et al*. (2025)

Number of flowers per plant

The result also showed that variety CHI001 has the least number of flowering (2.00) while the variety NCRIBEN 05E has the highest number of flowering (20.33) (Table 2). Number of flower per plant was recorded in an earlier by carried out by Vanishree *et al*. (2022).

Table 3: Showing phytochemical composition for different sesame varieties

S/N	Varieties (V)	Alkaloid (mg/100g)	Tannins (mg/100g)	Flavonoids (mg/100g)	Phenols (mg/100g)	Glycosides (mg/100g)	Saponin (mg/100g)
1	NCRIBEN 05E	0.107	2.563	3.087	3.183	0.057	0,720
2	NCRIBEN 04E	1.093	2.647	3.353	3.210	0.563	0.493
3	E83	0.513	2.500	3.540	3.190	0.710	0.703
4	CHI001 BLACK	4.260	2.547	3.643	3.173	4.233	4.100
5	GUJ BLACK	5.207	2.453	3.673	3.140	5.203	5.103

Phytochemical composition for different sesame varieties

The result for phytochemical composition of sesame varieties are showed below:

Alkaloid

The result for alkaloid revealed that sesame variety NCRIBEN 05E has the least alkaloid concentration (0.11 mg/100g) while variety GUBBLACK has the highest alkaloid concentration (5.21 mg/100g) (Table 3). The results are consistent with the work of Elleuch *et al*. (2007) who reported that sesame seeds are a good source of alkaliod.

Tannins

The result for tannins revealed that sesame variety GUJBLACK has the least tannins concentration (2.45 mg/100g) while variety NCRRIBEN 04E has the highest tannins concentration (2.65 mg/100g) (Table 3). The results are consistent with the work of Elleuch *et al*. (2007) who reported that sesame seeds are a good source of Tannins

Flavonoids

The result for flavonoids revealed that sesame variety NCRIBEN 05E has the least flavonoid concentration (3.09 mg/100g) while variety GUJBLACK has the highest flavonoid concentration (3.67 mg/100g) (Table 3). The results are consistent with the work of Elleuch *et al*. (2007) who reported that sesame seeds are a good source of Flavonoids.

Phenols

The result for phenols revealed that sesame variety GUJBLACK has the least Phenols concentration (3.14 mg/100g) while variety NCRIBEN 04E has the highest flavonoid concentration (3.21 mg/100g) (Table 3). The results are consistent with the work of Elleuch *et al*. (2007) who reported that sesame seeds are a good source of phenols.

Glycosides

The result for glycosides revealed that sesame variety NCRIBEN 05E has the least flavonoid concentration (0.06 mg/100g) while variety GUJBLACK has the highest flavonoid concentration (5.20 mg/100g) (Table 3). The results are consistent with the work of Elleuch *et al*. (2007) who reported that sesame seeds are a good source of Glycosides.

Saponin

The result for saponin revealed that sesame variety NCRIBEN 04E has the least saponin concentration (0.49 mg/100g) while variety GUJBLACK has the highest flavonoid concentration (5.10 mg/100g) (Table 3). The results are consistent with the work of Elleuch *et al*. (2007) who reported that sesame seeds are a good source of saponin.

CONCLUSION

In conclusion, the sesame varieties GUJBLACK and E8 performed very well in most of the morphological characterization such days to germination, germination percentage, number of leaves, plant height, number of branches and 100 seed weight. Phytochemical composition of different sesame varieties revealed that the variety GUJBLACK has the highest concentration of alkaloid, flavonoid, phenols, glycosides and saponin. The varieties NCRIBEN 05E and NCRIBEN 04E were observed to have least phytochemical composition in different sesame varieties.

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