Journal of Materials and Environmental Science
ISSN : 2028-2508
CODEN : JMESCN

J. Mater. Environ. Sci., 2025, Volume 16, Issue 2, Page 231-241

http://www.jmaterenvironsci.com

Physical and chemical characteristics of crude oil from *Blighia sapida* (Sapindaceae) aril collected in nine localities of Côte d'Ivoire

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Received *05 Jan 2025,*
Revised *28 Jan 2025,*
Accepted *29 Jan 2025*

***Citation**: Kanaté L., Soro Y., Soumahoro B. (2025) Physical and chemical characteristics of crude oil from Blighia sapida (Sapindaceae) aril collected in nine localities of Côte d'Ivoire, J. Mater. Environ. Sci., 16(2), 231-241*

Abstract: Crude oil from *Blighia sapida* aril collected in nine localities of Côte d'Ivoire was extracted by maceration in hexane. Its physical and chemical parameters were determined. Oil yield varies from 45.69 ± 0.70 to 57.62 ± 0.10%. Oil has a density of 0.89 ± 0.01 to 0.94 ± 0.05, a refractive index of 1.449 ± 0.002 to 1.467 ± 0.001, a viscosity of 51.60 ± 0.40 and 95 .67 ± 0.50 mPa.s and a hydrogen potential of 3.48 ± 0.02 to 6.27 ± 0.01. Acid, Peroxide, iodine and saponification index of this oil range from 2.66 ± 0.20 to 13.00 ± 1.22 mg KOH/g of oil, from 4.16 ± 0 .20 to 17.26 ± 0.30 meq O_2/kg of oil, from 75.68 ± 0.20 to 119.74 ± 0.20 g iodine per 100 g of oil and 175.92 ± 0.50 to 204.81 ± 0.30 mg KOH/g of oil, respectively. Water and volatile matter contents range from 0.05 ± 0.01 to 1.70 ± 0.01%. Oils are weakly oxidized with mean specific extinction values K232 varying from 1.198 ± 0.006 to 4.204 ± 0.004 and K270 ranging between 0.041 ± 0.004 and 1.249 ± 0.001. Statistical study showed a significant difference at the 5 % threshold in characteristics reflecting a variability of oil from different localities.

Keywords: *Aril, Oil, Blighia sapida, Index, Physical and chemical characteristics*

1. Introduction

Plants play an important role in people's lives, particularly those in Africa and their organs are generally used in traditional medicine or in food (Traoré S. *et al.*, 2024; Haddou *et al.*, 2024; Loukili *et al.*, 2022). Thus, numerous studies have been carried out to determine their physical and chemical parameters, their biological activities as well as their compositions (Traoré L. *et al.*, 2024; Haddou *et al.*, 2023). Ivorian flora is made up of a multitude of plants including wild oilseed plants or which are cultivated for their oil content. The best known are peanut, palm and cotton seeds. To diversify vegetable oil resources, it seemed interesting to target other oil seeds with very little value added and strong scientific and technological interests. Among these is *Blighia sapida*, a plant from Sapindaceae family. Originating in West Africa, it is widely distributed from Senegal to Cameroon and Guinea and has become a high priority species for domestication (Sinmisola *et al.*, 2019). Fruits, roots, leaves, bark and seeds of *Blighia sapida* are used in food and in traditional medicine to treat certain diseases (Sinmisola *et al.*, 2019). The light-yellow aril of ripe fruit is succulent and rich in oil (Ouattara *et al.*, 2010) and is used in food as a meat substitute in sauces (Wray *et al.*, 2020). Thus, populations of northern Côte d'Ivoire consume fresh or cooked arils. However, immature arils are often a source of toxicity due to a high concentration of hypoglycin A (Ogunkunle *et al*., 2015; Nabede *et al*., 2024). The richness of this plant in nutrients has motivated its introduction in certain countries such as Jamaica where the total value of its export amounted to just over $20 million in 2019 (Falloon *et al*., 2022a).

This plant has been the subject of some studies on nutritional composition of arils (Ouattara *et al*., 2010), on nutritional value of aril (Ouattara *et al*., 2024) as well as on determinations of physicochemical and functional properties of seed protein isolate (Falloon *et al*., 2022a), antioxidant activity of oil extracts, physicochemical composition of dried aril oils (Falloon *et al*., 2022b) and valorization of its shell into activated carbon (Tra et *al*., 2024).

Despite its strong nutritional potential, to our best knowledge there is no study on variability of oil from mature *Blighia sapida* aril from Côte d'Ivoire. The present work aims to determine physical and chemical parameters of mature aril oil of *Blighia sapida* from nine localities in Côte d'Ivoire.

2. Materials and methods

2.1. plant material

Plant material consists of ripe fruits of *Blighia sapida* (**Figure 1**) collected in the morning in December 2020 in nine localities in Côte d'Ivoire (**Table 1**). These fruits were transported in bags to laboratory where they were authenticated by Mr. Amani N'GUESSAN, botanist at Institut National Polytechnique Félix HOUPHOUËT-BOIGNY (INP-HB) in Yamoussoukro. Aril was removed from shell, separated from seed then cleaned with distilled water and stored away from light in refrigerator at 4°C until use.

(A): Ripe fruit in shell **(B) :** Aril and seed removed from shell **(C) :** Separated aril

Figure 1. Photograph of the steps for obtaining aril of *Blighia sapida*

Table 1. GPS coordinates of the nine studied localities

Localities	GPS coordinates	
	Latitude (N)	**Longitude (W)**
Napiéolédougou (Nap)	9°17'29.4"	5°35'39.5"
Niakaramadougou (Nia)	9°11'37.2"	5°10'08.3"
Katiola (Kat)	8°13'00.3"	5°07'10.3"
Yamoussoukro (Yak)	6°53'28.0"	5°13'36.0"
Abobo (Abo)	5°27'25.1"	4°04'29.9"
Soubré (Sou)	5°46'34.0"	6°37'03.1"
Guitry (Gui)	5°31'51.6"	5°14'39.5"
Grand-Lahou (GrL)	5°16'21.3"	5°07'48.1"
Daloa (Dal)	6°54'26.3"	6°26'17.3"

N : North ; W : West

2.2. Methods

2.2.1. Extraction of crude oil

Aril was dried in an oven at 60 °C for 3 days and then crushed using an IKA M20 brand electric grinder (France). The crude oil was extracted according to the method described by Kassi *et al.* (2019) for 24 hours.

2.2.2. Physical and chemical characteristics of oil

Physical and chemical characteristics of *Blighia sapida* oil were determined according to methods defined in **Table 2**.

Table 2. Methods for determining physical and chemical parameters

Physical and chemical parameters	Methods
Density at room temperature (27 °C)	(ISO-6883, 2017)
Refractive index	(ISO-6320, 2017)
Hydrogen Potential (pH)	(AOAC, 2000)
Viscosity	(Anderson-Foster et al., 2012)
Acid index	(ISO-660, 2020)
Iodine index	(ISO-3961, 2018)
Peroxide index	(ISO-3960, 2017)
Saponification index	(ISO-3657, 2020)
Specific absorbances or extinctions at 232 nm and 270 nm	(ISO-3656, 2011)
Water and volatile matter content	(ISO-662, 2016)

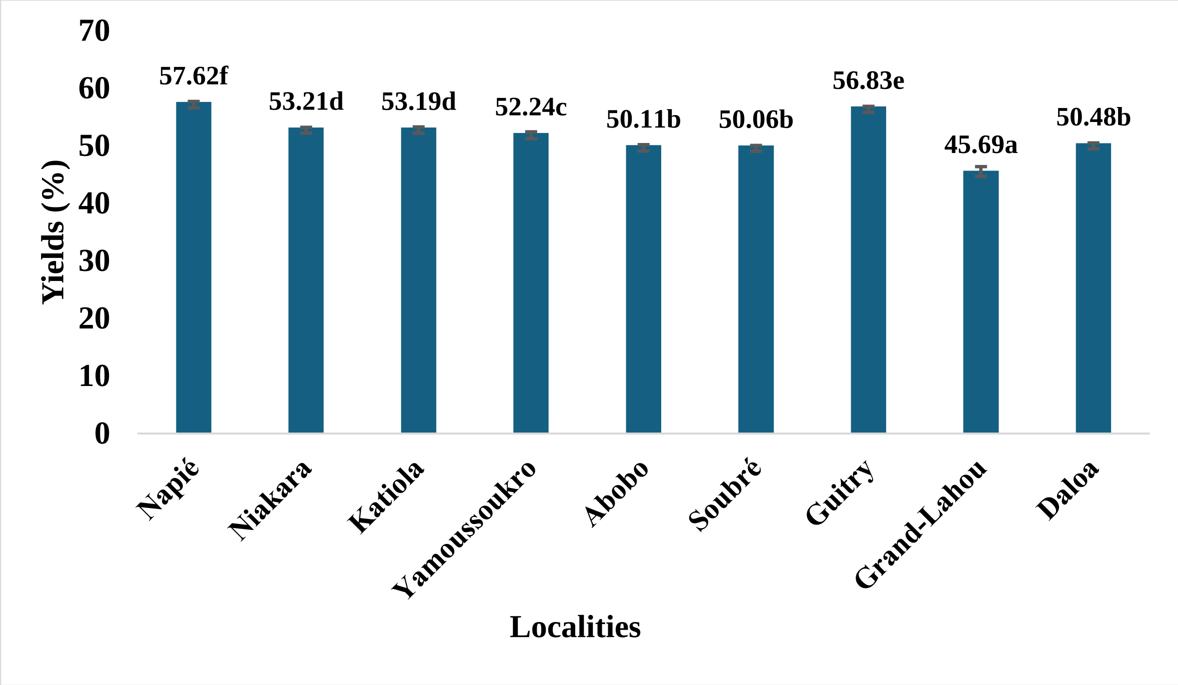
2.2.3. Statistical analyses

Results were expressed as mean ± standard deviation. The entire analysis was carried out with STATISTICA 7.1 software. Significant differences for comparison between oil from different localities were determined by ANOVA, followed by Duncan's LSD post hoc test with statistical significance of $p < 0.05$.

3. Results and discussion

3.1. Yields and appearance of Blighia sapida aril oil

At 25°C, crude oil of *Blighia sapida* aril from the nine studied localities, which has a very pleasant odor, has a light-yellow color for Katiola, Abobo and Grand-Lahou, orange-yellow color for Napiéolédougou (Napié), Niakaramandougou (Niakara) and Daloa, and dark orange-yellow color for Yamoussoukro, Soubré and Guitry. Extraction yields are shown in **Figure 2**. Yields of crude oil from aril of *Blighia sapida* range from 45.69 ± 0.70% for locality of Grand-Lahou to 57.62 ± 0.10% for that of Napiéolédougou (Napié). These results are consistent with those obtained in Côte d'Ivoire (45.32%) (Ouattara *et al.*, 2010), Ghana (48.80%) (Nabede *et al.*, 2022) and Togo (56.66 ± 0.27%) (Dossou *et al.*, 2014). These yields are similar to that of palm nut (30-55%) oil (Belitz *et al.*, 2009). They are higher than those of sunflower (44 – 45%), rapeseed (42 – 43%), olive (18 – 22%) and cotton seed (22 – 24%) (Belitz *et al.*, 2009; Evrard *et al.*, 2007). Yields obtained indicate that *Blighia sapida* (*B. sapida*) can be classified a fat-rich plant species and can be considered as an oleaginous species. This richness in oil makes aril of *B. sapida* an important source for oil mills and other agri-food industries. Differences in oil yields of the nine localities studied could be explained by factors such as harvest period, state of maturity of fruits and pedoclimatic factors that differ between localities (Coulibaly *et al.*, 2020).



Yields not followed by the same bold letter are statistically different at the 5% threshold (P <0.05).

Figure 2. Yields of crude oil of *Blighia sapida* aril from the nine localities studied

3.2. Physical characteristics of *Blighia sapida* aril oil

Physical characteristics of crude oil extracted from aril of *B. sapida* from the nine localities studied are presented in **Table 3**. The absence of standard references on *B. sapida* oil led us to compare our results with *Codex Alimentarius* standard and certain consumer oils.

Table 3. Physical characteristics of crude oil from aril of *Blighia sapida* from the nine localities

Localities	Density	Refractive index	Viscosity (mPa.s)	Hydrogen potential (pH)
Napiéolédougou	$0.94^{b.c} \pm 0.01$	$1.461^{b} \pm 0.001$	$51.60^{a} \pm 0.40$	$3.82^{c} \pm 0.02$
Niakaramandougou	$0.92^{b} \pm 0.02$	$1.462^{b.c.d} \pm 0.001$	$77.57^{d} \pm 0.90$	$4.07^{d} \pm 0.01$
Katiola	$0.93^{b.c} \pm 0.07$	$1.464^{c.d.e} \pm 0.001$	$85.37^{e} \pm 1.3$	$4.04^{d} \pm 0.01$
Yamoussoukro	$0.90^{a} \pm 0.01$	$1.449^{a} \pm 0.002$	$69.40^{c} \pm 0.70$	$3.48^{a} \pm 0.02$
Abobo	$0.90^{a} \pm 0.01$	$1.465^{e.f} \pm 0.001$	$66.47^{b} \pm 1.10$	$3.52^{a} \pm 0.05$
Soubré	$0.89^{a} \pm 0.01$	$1.464^{c.d.e} \pm 0.003$	$76.67^{d} \pm 0.70$	$6.27^{g} \pm 0.01$
Guitry	$0.94^{c} \pm 0.05$	$1.461^{c.b} \pm 0.003$	$95.67^{g} \pm 0.50$	$4.47^{e} \pm 0.03$
Grand-Lahou	$0.90^{a} \pm 0.03$	$1.464^{a.e.f} \pm 0.001$	$89.93^{f} \pm 0.90$	$3.71^{b} \pm 0.01$
Daloa	$0.90^{a} \pm 0.02$	$1.467^{f} \pm 0.001$	$75.93^{d} \pm 0.60$	$4.89^{f} \pm 0.02$

Means not followed by the same bold letter in the same column are statistically different at the 5% threshold (P <0.05).

Densities of *B. sapida* aril oil range from 0.89 ± 0.01 for locality of Soubré to 0.94 ± 0.01 for localities of Napiéolédougou and Guitry. Densities of Yamoussoukro, Abobo, Soubré, Grand-Lahou and Daloa are statistically identical at the 5% threshold (0.89 ± 0.01 to 0.90 ± 0.03) but differ from those of Napiéolédougou, Niakaramandougou, Katiola and Guitry (0.92 ± 0.02 to 0.94 ± 0.05). These oils, except that of Soubré, have densities similar to that obtained in Nigeria (0.91) (Oladiji *et al.*, 2009; Oluba et *al.*, 2021), in Togo (0.92) (Nabede *et al.*, 2022) and in Côte d'Ivoire (0.93) (Moya *et al.*, 2018). These densities are mainly close to those of edible vegetable oils such as palm oil (0.89 - 0.90), cotton, corn and soybean oils (0.92 - 0.93) with normative densities ranging from 0.91 to 0.96 (Codex Alimentarius, 2015). Density of an oil being influenced by its chemical composition, *B. sapida* oil from the two groups of localities studied could have different fatty acids and minor component compositions (Fakhri and Qadir, 2011). Refractive index is a good indicator of predominant fatty acid composition and state of degradation of an oil. Its values vary from 1.449 ± 0.002 for Yamoussoukro to 1.467 ± 0.001 for Daloa with significant differences (P <0.05) between localities. These values are close to those of *Zizyphus lotus* L. oil (1.46) (Makhdar *et al.*, 2019), peanut (1.460 - 1.464) and corn (1.465 - 1.468) oils but they are slightly higher than those of palm oil (1,458 - 1,460) and coconut oil (1,448 - 1,450) (Codex Alimentarius, 2015). Low refractive index value of Yamoussoukro oil (1.449 ± 0.002) could indicate its instability.

Table 3 shows that viscosity of *B. sapida* aril oil from the nine localities differs from one locality to another. Guitry has the highest viscosity (95.67 ± 0.5 mPa.s) which is close to that obtained in Jamaica (98.21 mPa.s) (Anderson-Foster *et al.*, 2012). This value is approximately double that of Napiéolédougou oil (51.6 ± 0.4 mPa.s). This high viscosity of Guitry oil could be the consequence of its "thick" physical appearance. Except Guitry, oil from other localities has a lower viscosity than oil from dried pumpkin seeds (93.659 ± 0.48 cP) obtained in Iran (Gohari *et al.*, 2011). Viscosity values obtained in this work are all greater than those of raspberry (26.0 cP), safflower (47.3 cP) and grape seed (49.4 cP) oils (Oomah *et al.*, 2000). Viscosity is an important parameter in industrial processes and could be useful in evaluating the quality of our oils for use in frying (Nichols and Sanderson, 2010).

Results in **Table 3** indicate that hydrogen potential (pH) values of *Blighia sapida* aril oil from the nine localities, significantly different, vary from 3.48 ± 0.02 to 6.27 ± 0, 01 for Yamoussoukro and Soubré, respectively. All these oils are acidic (pH < 7). The more accentuated acidity of Yamoussoukro oil could indicate a greater presence of free acids and would agree with the results of refractive index. The high pH value of the oil from Soubré (6.27 ± 0.01) could indicate its good conservation.

Differences in the physical parameters of *Blighia sapida* crude oil in the nine localities may be explained by factors such as harvest period, state of maturity of fruits and pedoclimatic factors which differ from one locality to another (Coulibaly *et al.*, 2020).

3.3. Chemical characteristics of *Blighia sapida* aril oil

Chemical characteristics of crude of *B. sapida* aril oil extracted from the nine localities are presented in **Table 4**. The absence of standard references on *B. sapida* oil led us to compare our results with the *Codex Alimentarius* standard and certain consumer oils.

Acid index measures quantity of free fatty acids resulting from hydrolytic, enzymatic or chemical reactions of triglycerides. It is a quality criterion for reporting conservation status of an oil. Acid index of crude oil of *B. sapida* aril from studied localities varies from 2.66 ± 0.20 mg KOH/g of oil for Napiéolédougou to 13.00 ± 1 .22 mg KOH/g of oil for Yamoussoukro. Only values of Napiéolédougou (2.66 ± 0.20 mg KOH/g of oil), Katiola (3.61 ± 0.20 mg KOH/g of oil), Soubré (3.35 ± 0.01 mg KOH/g of oil) and Guitry (3.97 ± 0.06 mg KOH/g of oil) comply with the limit value of *Codex Alimentarius* standard (4 mg KOH/g of oil). Acid index values of the latter three localities are close to those obtained in Jamaica (3.2 ± 1.3 mg KOH/g of oil) (Falloon *et al.*, 2022b) and Nigeria (3 .31±0.15 mg KOH/g of oil) (Oluba et *al.*, 2021). Acid index values are not completely correlated with those of hydrogen potential. Locality of Soubré, for example, has the highest pH value (6.27) (**Table 3**) while it has the second lowest acid index value. These results could indicate that free fatty acids are not solely responsible for the pH of oils. Low acidity could indicate the stability of oils from this group of localities over a long period of time and could be attributed to the presence of natural antioxidants in these oils, such as vitamins A and C, as well as other phytochemicals such as flavonoids (Ichu and Nwakanma, 2019). However, the high acid index obtained for Yamoussoukro, Grand-Lahou and Daloa could be explained by the very advanced maturity of fruits which would lead to their deterioration and consequently to the increase in free fatty acids content, under action of lipases before oil extraction (Boulfane *et al.*, 2015). In addition, bruising of the fruit, due to its fall from tree, could promote contact of fruit enzymes with substrates and development of lipolytic acidity (Hussein *et al.*, 2016). Thus, these undesirable fatty acids formed during these processes could be eliminated during refining of these oils.

Peroxide index is a very useful parameter for assessing the first stages of oxidative deterioration, which is a slow but inevitable process, characterized by the presence of peroxides. It can be used to evaluate free acids content and other autoxidation products or aldehydic rancidity. Peroxide index values of crude oil of *B. sapida* aril from studied localities range from 4.16 ± 0.20 meq O_2/kg of oil for Abobo to 17.26 ± 0. 30 meq O_2/kg of oil for Yamoussoukro. These values are all higher than those obtained for oils from Abidjan (Côte d'Ivoire) (3.92 ± 0.01 meq O_2/kg of oil) (Moya *et al.*, 2018) and Jamaica (1.9 ± 0.4 meq O_2/kg of oil) (Falloon *et al.*, 2022b). Our indices are nevertheless much lower than those obtained by Ouattara *et al.* (2010) (174.44 ± 0.09 meq O_2/kg of oil) but they are higher than those of kernel butters of some mango varieties (1.40 – 2.23 meq of O_2/kg of butter) (Kassi *et al.*, 2019). Peroxide indices obtained in this study are all lower than the limit value allowed for edible crude vegetable oils (≤15 meq O_2/kg of oil) except for Yamoussoukro (17.26 ± 0.3 meq O_2/kg of oil) (Codex Alimentarius, 2015). The high values of this index for oil from Niakaramandougou (12.32g ± 0.20 meq O_2/kg of oil) and Yamoussoukro could be due to oxidation of unsaturated free fatty acids present, which could lead to their rapid deterioration. This oxidation could be enhanced by the presence of oxygen and certain promoting factors such as enzymes and traces of metals such as Cu and Fe.

Iodine index of oil from studied localities, which gives an overall indication of unsaturation of a fatty substance, ranges from 75.68 ± 0.20 g I_2/100g of oil for Yamoussoukro to 119.74 ± 0.20 g I_2/100g of oil for Daloa (**Table 4**). Similar values were observed in Togo (87 g I_2/100g) (Nabede *et al.*, 2022). Our values are higher than those obtained in Jamaica (47 and 56 g I_2/100g of oil) (Falloon *et al.*, 2022b) but lower than that obtained in Nigeria (125.33 g I_2/100g of oil) (Oladiji *et al.*, 2009). These relatively high values could indicate that these oils contain numerous unsaturations at the level of unsaturated fatty acids and are di-unsaturated semi-siccative linoleic type (iodine index between 110 and 150 g I_2/100g of oil) for Abobo, Soubré and Daloa or monounsaturated semi-siccative of oleic type (iodine index between 50 and 110 g I_2/100g of oil) for other localities (Blayo, 2002). Iodine values for oil in studied localities are mostly in the same order as those of peanut oil (77 – 107 g I_2/100g of oil) and cotton oil (100 – 123 g I_2/100g of oil) (Codex Alimentarius, 2015). Saponification index of an oil provides information on the average molecular weight and, consequently, on the length of carbon chain of its fatty acids. It is higher when carbon chain of fatty acids is short (Gohari *et al.*, 2011). Saponification index of *B. sapida* oil varies from 175.92 ± 0.50 mg KOH/g of oil to 204.81 ± 0.30 mg KOH/g of oil for Abobo and Yamoussoukro, respectively (**Table 4**). It varies significantly ($p < 0.05$) between Abobo, Soubré and Yamoussoukro with other localities. However, no significant difference ($p < 0.05$) was observed between oil from Guitry, Katiola and Grand-Lahou and between oil from Daloa and Niakaramandougou. These values agree with that obtained by Nabede *et al.* (2022) in Togo which was 195.17 ± 0.04 mg KOH/g of oil.

Table 4. Chemical characteristics of *B. sapida* aril oil from nine localities

Samples	Acid index (mg KOH/g)	Peroxide index (méq O_2/kg of oil)	Iodine index (g I_2/100g of oil)	Saponification index (mg KOH/g of oil)	Water and volatile matter volatiles (%)	K_{232}	K_{270}
***Bs* Nap**	$2.66^{a} \pm 0.20$	$8.13^{de} \pm 0.90$	$86.84^{b} \pm 0.20$	$185.41^{b} \pm 0.80$	$1.70^{i} \pm 0.01$	$2.214^{e} \pm 0.001$	$0.179^{g} \pm 0.001$
***Bs* Nia**	$6.25^{b} \pm 0.50$	$12.32^{g} \pm 0.20$	$98.07^{c} \pm 0.20$	$193.43^{d} \pm 0.30$	$0.60^{f} \pm 0.01$	$2.573^{f} \pm 0.004$	$0.565^{h} \pm 0.001$
***Bs* Kat**	$3.61^{a} \pm 0.20$	$8.49^{e} \pm 0.01$	$97.04^{c} \pm 0.20$	$186.53^{c} \pm 0.50$	$0.30^{d} \pm 0.01$	$2.202^{d} \pm 0.001$	$0.112^{d} \pm 0.001$
***Bs* Yak**	$13.00^{e} \pm 1.22$	$17.26^{h} \pm 0.30$	$75.68^{a} \pm 0.20$	$204.81^{f} \pm 0.30$	$0.24^{c} \pm 0.01$	$4.204^{g} \pm 0.004$	$1.249^{i} \pm 0.001$
***Bs* Abo**	$4.23^{a} \pm 0.40$	$4.16^{a} \pm 0.20$	$116.51^{d} \pm 0.20$	$175.92^{a} \pm 0.50$	$0.39^{e} \pm 0.01$	$1.213^{b} \pm 0.001$	$0.136^{e} \pm 0.004$
***Bs* Sou**	$3.35^{a} \pm 0.01$	$6.99^{c} \pm 0.01$	$118.66^{d} \pm 0.20$	$198^{e} \pm 0.60$	$0.14^{b} \pm 0.01$	$1.217^{b} \pm 0.004$	$0.041^{a} \pm 0.004$
***Bs* Gui**	$3.97^{a} \pm 0.06$	$9.99^{f} \pm 0.01$	$98.33^{c} \pm 0.20$	$186.53^{c} \pm 1.00$	$1.57^{h} \pm 0.01$	$2.190^{c} \pm 0.007$	$0.101^{c} \pm 0.004$
***Bs* GrL**	$11.03^{d} \pm 0.10$	$6.15^{b} \pm 0.20$	$88.1^{b} \pm 0.20$	$187.19^{c} \pm 0.20$	$0.05^{a} \pm 0.01$	$1.198^{a} \pm 0.006$	$0.075^{b} \pm 0.004$
***Bs* Dal**	$8.15^{c} \pm 0.09$	$7.45^{cd} \pm 0.01$	$119.74^{d} \pm 0.20$	$192.56^{d} \pm 0.20$	$0.77^{g} \pm 0.01$	$2.215^{e} \pm 0.004$	$0.138^{f} \pm 0.004$

Means not followed by the same bold letter in the same column are statistically different at the 5% threshold (P <0.05). K232: specific extinction at 232 nm, K270: specific extinction at 270 nm. Bs Nap, Bs Nia, Bs Kat, Bs Yak, Bs Abo, Bs Sou, Bs Gui, Bs GrL, and Bs Dal designate oil of Blighia sapida aril from Napiéolédougou, Niakaramandougou, Katiola, Yamoussoukro, Abobo, Soubré , Guitry, Grand-Lahou and Daloa, respectively

Thus, *B. sapida* oil would generally contain fatty acids of intermediate length of carbon chain of fatty acids. Saponification index values of oil from the different localities are close to those of palm oil (190-209 mg KOH/g of oil), soybean oil (189-195 mg KOH/g of oil) and peanut (187-196 mg KOH/g of oil) usually used in food (Codex Alimentarius, 2015).

Water and volatile matter contents of *B. sapida* oil from the nine studied localities vary from 0.05 ± 0.01 to 1.70 ± 0.01% for Grand-Lahou and Napiéolédougou, respectively, with a significant difference ($p < 0.05$) between all localities. These values are all lower than that obtained in Nigeria (10.90 ± 0.05%) (Oladiji *et al.*, 2009). Except for Grand-Lahou and Soubré oil, these contents are higher than the maximum content recommended by regulations for foods, which must be less than or equal to 0.2% (Codex Alimentarius, 2015). These contents are generally close to those of palm oil (0.05 - 2%) and cotton oil (0.80 - 1.50%) but are lower than those of oil and butter from kernels of certain mango varieties collected in Côte d'Ivoire (1.95 to 12.30%) (Kassi *et al.*, 2019). The high presence of water and volatile matter in oil from the studies localities could promote hydrolytic or enzymatic alteration leading to the release of free fatty acids that are much more sensitive to oxidation and to formation of oxidation products (Baena *et al.*, 2022). These high values could also reflect hygroscopic nature of this oil.

Spectrophotometric examination in ultraviolet provides important indications on the quality of oils (suitability for preservation) and allows the presence of primary fatty acid oxidation products (linoleic hydroperoxides, oxidized fatty acids) at 232 nm, and secondary fatty acid oxidation products (alcohols, unsaturated ketones, diketones) at 270 nm to be assessed (Tanouti *et al.*, 2010; Tchiégang *et al.*, 2005). Average values of specific extinction in ultraviolet K_{232} at 232 nm and K_{270} at 270 nm obtained did not exceed the upper limits established for olive oil which are respectively 2.60 and 0.25 except Yamoussoukro oil with values of K_{232} = 4.204 ± 0.004 and K_{270} = 1.249 ± 0.001 and which presented the highest peroxide index value (17.26 ± 0.3 meq O_2/kg of oil). Thus, except for Yamoussoukro oil, the studied oils are weakly oxidized.

Differences in the chemical parameters of *Blighia sapida* crude oil from the nine localities could be explained by factors such as harvest period, state of maturity of fruits and pedoclimatic factors which differ from one locality to another (Coulibaly *et al.*, 2020).

Conclusion

Physical and chemical characteristics of crude oil from *Blighia sapida* aril collected in nine localities in Côte d'Ivoire were determined to contribute to its valorization. Crude oil was obtained with an average yield of 52.16%. Generally, its physical and chemical characteristics show variability depending on the locality of collection as well as its stability and good food quality, important for its use in the food industry. Its high saponification index could make it a serious candidate in soap industry. This oil could be refined to improve its quality and tests are ongoing.

Acknowledgement: The authors are grateful to Mr. Antoine Amani N'GUESSAN, botanist at the laboratory of botany of the department of Agriculture and Animal Resources of the National Polytechnic Institute Félix HOUPHOUET-BOIGNY of Yamoussoukro. His help was invaluable in the authentication of plants.

Disclosure statement: *Conflict of Interest:* The authors declare that there are no conflicts of interest.

Compliance with Ethical Standards: This article does not contain any studies involving human or animal subjects.

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