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CHANGES IN LIPID CONTENT OF UNGERMINATED AND GERMINATED SEEDS OF *CAPSICUM ANNUUM L.* AND *AFRAMONUM MELEQUETA K.* SCHUM

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ABSTRACT

The lipid contents of ungerminated and germinated seeds of *Capsicunl srmuurn* and *Atremomum melequeta* were studied to determine the level of total lipids, neutral lipids and phospholipids. The percentage germination of *Capsicum annuum* and *Aframomum melequeta* were 95±2.0% and 90±1.5% respectively. The total lipids of ungerminated and genninated seeds of *C. annuum* were 37.50% and 26.44% respectively. The neutral lipid, glycolipid and phospholipids of ungerminated seeds of C *.annuum* were 30.75%, 2.3% and 4.45% respectively while that of qerrnlnated seeds of *C annuum* was neutral lipid 21.65%, glycolipid 1.27% and phospholipids 3.49%. The neutral lipid, glycolipid and phospholipids of ungerminated seeds of *A. melequeta* were 67.72%, 3.75% and 13.68% respectively while that of germinated seeds were neutral lipid 50.0%, glycolipid 2.38% and phospholipids 10.12%. Neutral lipids were the major components while glycolipids and phospholipids formed the minor components. The colour of C. *annuum* lipid extracted was brownish and solid at room temperature while that of *A. melequeta* was also brownish but oily at room temperature. Both lipids were aromatic. Thin layer chromatographic analysis revealed three lipid classes which were oleic acid, palmitic acid and cholesterol. The seed lipids of C. *annuum* and *A. melequeta* can be used as edible oil and for industrial purposes.

KEYWORD: Lipid, *Capsicum annuum* and *Aframomum melequeta*

INTRODUCTION

Capsicum annuum belongs to the family solanaceae. It is a small bushy annual of 30cm - 1.5 tall. It is sometimes herb or sub-shrub (Burkill, 1994). It is an important ingredient in most Nigerian cooked dishes. It is used fresh as food condiment (Etukudo, 2003). Infusion/volatile oil of the fruits is used to cure ringworm and rheumatism (Odeomena, 1997). The leaves are used for word dressing, cuts and ulcers (Etukudo, 2003). *Aframomum melequeta* is a member of the family zingiberaceae. It is a perennial monocotydonous herbaceous plant that produces spicy edible fruits. The seeds of *A. melequeta* are approximately oval in shape, hard and shiny with reddish brown colour (Dutta, 2003). *A. melequeta* is used as an effective anti-fungal and anti-microbial agent (Ellis and Reddy, 2002, Odeomena and Essien 1995). Some workers have reported increase in lipid levels in the Hazel seeds (Shewry, Purifield and Stobert, 1972). This increase in lipid content of germinating Hazel seeds contrasts with a decrease reported in the total lipid content in cotyledons of germinating garden peas *(Pisum sativa)* (Quantes and Danson,1969) and cotton (Joshi and Doctor, 1972). However, in *Cory/us avellenal* no significant change was found in the level of triglyceride components during germination. Similar non-specific utilization of triglyceride acid in germinating seeds was reported in *Citrullus vulgaris* and in *Ricinus dtrillus* (Crombie and Comber, 1956).

Most of the tropical African seeds are already beset with food crisis which threaten nutritional well being. About 50% of edible and useful' crop plants are still wild and there is a dearth of information on their nutritional potentials (Essien *et al,* 1995). The seed lipids of ungerminated and germinated seeds of *capsicum annuum* and *Aframomum melequeta* has not been clearly studied and documented this work aims to study such.

MATERIALS AND METHOD

Sources and Collection of Samples

Mature fruits of *capsicum annuum* var. grossum and *Aframomum melequeta* were obtained from local cultivars grown in Uyo Local Government of Akwa Ibom State.

Pre-Treatment of the Samples

The fruits of C *annuum* and *A, melequeta* were depulped to obtain the seeds which were screened visually to remove the deteriorating ones. Good quality seeds were taken to the pharmacognosy laboratory of University of Uyo for extraction.

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Treatment of the Samples

Fifty grams of *Capsicum annum* was divided into 20g and 30g. The 20g of seed sample were used for experiments on ungermination while 30g were used for germination. Thirty grams of *Capsicum annuum* seed were sterilized with O.1M Hcl according to the method described by Esenowo (2004). Twenty grams of the air-dried seedlings were used for extraction of lipids. Two hundred and twenty grams of *A. melequeta* and germination experiments respectively. 120g was placed in a 250ml beaker and chilled in a refrigerator for seven days to break dormancy (Esenowo, 2004). The chilling experiment replicated thrice. On germination 100g of the air-dried seedlings were used for lipid extraction.

Lipid Extraction and Analysis

The method of Esenowo (2004) was adopted for extraction. Lipids were extracted by grading each set of seed sample with a sterile mortar and pestle. Propanol (200m\) was added while grinding to inactivate the enzymes. Each set of the ground seeds were suspended with stiring in 200ml of chloroform-methanol (2:IV/V). Butylated hydroxy toluene (0.005% W/V) was added as anti-oxidant to protect polyunsaturated fatty acids. The filtrates were evaporated to dryness in a hot water at S00e. The weight of the total lipids was determined gravimetrically. The dried extracts (total lipids) were fractionated into neutral lipids (NL), glycolipids (GL) and Phospholipids (PL) on silicic acid column using chorloform, acetone and methanol successively (Rouser *et el.* 1970).

Thin Layer Chromatography

The method of Esenowo 92004) was used. 50g of silica gel was prepared in 120ml of distilled water in 250ml beaker. Four glass plates measuring 20cm x 20cm with O.4mm thickness were used for the TLC. The four plates were pre-washed with acetone to remove any contaminating lipid materials. The plates were coated by spreading the slurry with automatic spreader drawn by hand to a thickness of 0.25mm. The coated plates were dried and then activated by heating at 1l0Dc for 30 minutes before use. An aliquot of 3ml each of the fractions dissolved in 5ml of chloroform-methanol-water (60:30:45) was applied on the plates at a distance of 2cm from the edge by spotting with capillary tube. Authentic standard solution of palmitic acid, cholesterol and oleic acid were applied to different lanes on the plates using capillary tube. The test samples were applied to the plates. The neutral lipids, glycolipids and phospholipids chromatoplates were developed with a mixture of petroleum ether, diethyl ether and acetic acid (90: 10:1) as the solvent system. When the solvent ascended up to 2cm to the top, the plates were removed and air dried. Spots were made visible by viewing under ultraviolet light and made more visible with iodine vapour. The RF ratio of each lipid was calculated.

RESULTS AND DISCUSSION

The percentage of ungerminated seeds of *Capsicum* annuum and *Aframomum melequeta* were 0±1.5% and 0±1.5% respectively. The germination percentage of *Capsicum annuum* and *Aframomum melequeta* were 95±2.0$ and 90±1.5% respectively. The percentage of the total lipid for both ungerminated seeds of *Capsicum annuum* and *Aframomum melequeta* were 16.0% and 5.1 % respectively. Fractionation of the total lipid by silicic acid column chromatography into neutral-lipid, glycolipid and phospholipids indicated that the total lipid of ungerminated seeds of *Capsicum annuum* consisted of 9.0% of neutral lipid, 2.0% glycolipid and 5.0% phospholipids while that of ungerminated *Aframomum melequeta* was 3.02% neutral lipid, 0.78% glycolipid and 1.30% phospholipids (Tables 1 and 2).

Similarly, the percentage of the total lipid of germinated seeds of *capsicum annuum* and *Aframomum melequeta* were 14.9% and 4.6% respectively. Fractionation of the total lipids by silicic acid column chromatography..showed that for C. *annuum* the neutral lipid was 8.7%, glycolipid 1.8% and phospholipids was 4.4%, for *Aframomum melequeta* the neutral lipid represented 2.98%, glycolipid was 0.72% and phospholipids was 1.0% (Tables 1 and 2). The result of the TLC analysis shows that the point of origin on the plate was 2.0cm and the solvent front was 15.6cm. The thin layer chromatography of C *annuum* and *Aframomum melequeta* showed three classes of lipids which are oleic acid, palmitic acid and cholesterol.

The total lipids of ungerminated and germinated C *annuum* are low compared to lipid in some oil yielding seeds such as groundnut (43 - 46%), sesame (45 - 50%), coconut 950 - 65%) and castor seed (36 - 40%) as reported by Dutta (2003). The total lipids of undergminated and germinated *Aframomum melequeta* are high compared to the value of total lipid of African Mango *(Irvingia gabonensis)* reported by Nya *et al* (2003) to be 51.3%. The neutral lipid *Aframomum melequeta* and C *annuum* represented the major component while the glycolipid and phospholipids formed minor component.

Similar observations were made by Opute (1979) who found that non-polar lipids of *psidium guajava* represented 90% of the total lipids while glycolipid and phospholipids represented 6.4 and 3.6% respectively. This indicated that the major components of seed lipids are the neutral lipid while glycolipid and phospholipids are the minor components. The colour of both lipids were brownish, C *annuum* oil was solid at room temperature while that-of *Aframomum melequeta* was oily at room temperature. The characteristics of the brownish colour of most fats and oils are due to the presence of various carotenoid pigments which are highly unsaturated hydrocarbon chains *(Swift et al, 1944).* The oily or lipid nature of these lipids at room temperature agree with the report of Campbell *et al* (1999) who indicated that the plant *oils* that are lipid at room temperature have a higher proportion of unsaturated fatty acids than do animal fats, which tend to be stolid.

TABLE 1: Total Lipid Content of Ungerminated and Germinated Seeds of *C. annuum* AND *A. melegueta* Express as Percentage

Seed type used	Weight of total lipid g/kg	Total lipid expressed in percentage
Capsicum annuum (ungerminated)	3.20	16.0
Capsicum annuum (germinated)	2.98	14.9
Aframomum melequeta (Ungerminated)	5.1	5.1
Aframomum melequeta (Germinated)	4.6	4.6

TABLE 2: Lipid Fractions of Ungerminated and Germinated Seeds of *C. annuum* and *A. melegueta*

Seed type used	Neutral Lipid %	Glycolipid %	Phospholipids %	Total lipid
C. annuum (Ungermination)	9.0	2.0	5.0	16.0
C. annuum (Germinated)	8.7	1.8	4.4	14.9
A. melegueta (Ungerminated)	3.02	0.78	1.30	5.1
A. melegueta (Ungerminated)	2.98	0.72	1.0	4.6

REFERENCES

Burkill, H. M., 1994. Useful plants of West Tropical Africa. 2 Families E – I Royal Botanical Gardens, kew Crambie, W. M. and Comban, R. (1956). Fat metabolism in germinating copullus vulqaris. Journal of experimental Botany 7, 166 - 180.

Campbell, M. K., 1995. Biochemistry, 2nd edition, Saunders college publlshers, USA. Dutta, A. C. (2003). *Botany for Degree Students.* 6th edition, oxford University press.

Ellis, J. M. and Reddy, P., 2002. Effect of panax Ginseng on quality of life. The annuals of pharmacotherapy 36:375 - 379.

Esenowo, G. J., 2004. Element of Biotechnologgy. Bowie print enterprises and publish company, Uyo, Nigeria 111 - 125.

Essien, E. U., Esenowo, G. J. and Akpanabrata, M., 1995. Lipid composition of lesser known tropical seeds. Journal of plant foods for human nutrition. Kluwer AcademiC publishers, Netherlands.

Etukudo, I., 2003. *Ethnobotany.* Conventional and Traditional uses of plants. Verdict press, Uyo.

Joshi, A. C. and Doctor, V. M., 1975. The fatty acid content of germinated cotton seeds. Lipid 10: 181 - 183.

Nya, P. J. Omokaro, D. N. and A. E. Nkang., 2003. Global journal of pure and Applied Sciences 9: 165 - 169.

Odeomena, C. S., 1997. The phytochemical study on the fruits of seven varieties of Capsicum annuum *L*. A dissertation submitted to University of Uyo, Uyo.

Odeomena, C. S. and Essien, J. D., 1995. The antibacterial activities of fluted pumpkin *(Telfairia occidentalis)* roots. West African Journal of Biology and Applied Chemistry 40 (1 - 4), 29 - 32.

Opute, F. 1., 1978. Seed lipids of grain amaranthus. Journal of Experimental Botany 30: 601 - 611.

Quarles, R. H. and Danson, R., 1969. The phospholipids of tea seed. Biochemical Journal 112, 787 - 94.

Rouser, G. and Yamamota, A., 1970. Thin layer chromatographic separation of polar lipid and determination of phospholipids by phosphorus identification of spots.

Shewry, P. R., Pinfield, N. J, Strobart, A. K., 1972. The Glycerides acyl and fatty acid of germinating hazel seeds. *Phytochemistry* 11, 2149 - 2154.

Swift, C. E., Mann, G. E., Fisher, G. S., 1994. Oil and soap 21, 317 - 320 Cf. Industrial oil and fat products, ed Bailey Inter-science publication company, New York. 500.