# A note on the amino acid content of *Pachira insigenes*

J. K. B. A. ATA
*Food Research Institute, P.O. Box M.20, Accra, Ghana*

SUMMARY

The amino acid profile of the solvent extracted meal of *Pachira insigenes* has been studied. A very high level of lysine is recorded and the pattern appears to be fairly comparable to solvent extracted soya bean meal.

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RÉSUMÉ

ATA, J. K. B. A.: *Note sur la composition en amino-acides de* Pachira insigenes. L'auteur a étudié la composition en amino-acides de la farine de noix de *Pachira insigenes* déshuilée au moyen d'un solvant (hexane). Une haute teneur en lysine a été observée et l'image d'ensemble paraît comparable à celle de la farine de graines de soja déshuilée.

## Introduction

*Pachira insigenes* belongs to the family of **Bombacaceae** (MacMillan). It is a native of tropical America, and has about 20 species all growing in warm regions. The name *Pachira* is the native Guiana name. *Pachira insigenes* is not recorded by Hutchison & Dalziel (1954), but this may be synonymous with *Pachira oleaginea* (Decne). The current name appears to be *Bombax sessile* (Berth). Robyns (1963) also describes *Bombacopsis glabra* (Pasg), with an original name *Bombax oleagineum* (Decne), and Pieraerts, Ipatieff & Simar (1928) related *Pachira acquatica* to *B. glabra*. Earlier work by Cornelius, Hammonds & Shone (1965) showed that the oil of *Bombacopsis glabra* seed contained about 34·5% of cyclopropenoid acid, which has been shown by Kircher & Arner (1964) to be physiologically active and by Scheneider (1963) to be toxic to chicken and rats. The present study was undertaken to examine the fat free meal for its amino acid profile.

## Materials and methods

Fresh and mature *Pachira* nuts, obtained from Bunso Agricultural Research Station, were dried in an oven at 100 °C for 3 h and deshelled by hand. The percentage by weight of shell was calculated and proximate analysis was done on the deshelled nuts.

The deshelled nuts were then ground coarse, and the oil extracted using hexane in a soxhlet apparatus. The meal was ground into powder after evaporating off the solvent and passed through a 12-xx mesh sieve. The meal was then analysed for its amino acids.

## Results and discussion

The results of the analyses are shown in Tables 1 to 4. From Table 2, high levels of the cyclopropenoid acid, sterculic acid, as determined by the method of Durbetaki (1956) and by nuclear magnetic resonance were realized. Though this figure was not as high as that found in *B. glabra* seed oil, it was still considered unfit for consumption. From results in Table 3, high levels of lysine are recorded, which makes the use of defatted *Pachira* flour for protein supplementation trials very profitable. The profile compares favourably with the profile of solvent extracted soya bean as determined by Baumgarten, Mathen & Stone (1946). Much of the emphasis being laid on soya beans today is not only due to the high protein (N × 6·25) level but also to the high content of limiting amino acids, e.g. lysine. The high level of

TABLE 1
*Analytical Data on Shelled* Pachira *Nuts*

| | |
|---|---|
| Average % shells | 25·0 |
| Moisture | 4·0 |
| Protein (6·25 × N) | 16·0 |
| Fat (soxhlet) | 43·7 |
| Fibre | 1·8 |
| Ash | 3·7 |
| Nitrogen free extract | 30·8 |
| Calcium | 0·2 |
| Phosphorus | 0·8 |

TABLE 2
*Some Constants for* Pachira insigenes *Oil*

| | |
|---|---|
| Refractive index at 40 °C | 1·4605 |
| Saponification value | 209·6 |
| Iodine value (Wijs) | 61·2 |
| Cyclopropenoid fatty acid | 21·0% |

TABLE 3
*Amino Acid Profile of* Pachira *Compared to Soya Bean*

| *Amino acid* | *Pachira flour per 16g N* | *Soya bean meal solvent extracted** |
|---|---|---|
| Aspartic acid | 9·6 | — |
| Threonine | 3·4 | 3·7 |
| Serine | 5·5 | — |
| Glutamic acid | 20·4 | — |
| Proline | 2·5 | — |
| Glycine | 4·6 | — |
| Alanine | 4·6 | — |
| Valine | 5·1 | 5·3 |
| Methionine | 1·7 | 1·6 |
| Iso-leucine | 3·8 | 6·2 |
| Leucine | 6·9 | 7·9 |
| Tyrosine | 2·7 | 2·1 |
| Phenyl-alanine | 4·8 | 4·7 |
| Lysine | 5·8 | 5·3 |
| Histidine | 2·1 | 3·0 |
| Arginine | 9·3 | 5·3 |

*From Baumgarten, Mathen & Stone (1946)

TABLE 4
*Proximate Analysis on Defatted* Pachira *Flour*

| | % |
|---|---|
| Moisture | 8·1 |
| Protein (N × 6·25) | 26·5 |
| Oil | 12·8 |
| Crude fibre | 5·7 |
| Ash | 5·7 |
| Nitrogen-free extract | 41·2 |
| Total | 100·0 |

lysine found in *Pachira* initially should raise the hope of researchers in advancing work on the utilization of *Pachira* meal. Cornelius, Hammonds & Stone (1965) declared the oil of *Pachira* unfit for human consumption due to the presence of the toxic substance, sterculic acid, also a constituent of the oil fraction. There is no information up-to-date which has shown any toxic substance in the fully defatted meal. Just as in cotton-seed, the extracted oil is edible despite the presence of gossypol in the meal, and the fact that sterculic acid is fat based, gives some initial hope of the fully defatted *Pachira* meal being a good source of protein, rich in lysine and useful for supplementation of cereals lacking in this amino acid.

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