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Effect of processed akuamma seed (*Picralima nitida*) as additive in broiler chicken feed "A Review"

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Abstract

Chemical residues from antibiotics in livestock production has caused negative impact on human health. The use of plant materials as a replacement of conventional growth promoters in broilers has given results in all aspects of the meat production chain, such as improvements in product performance, carcass, and meat quality. It plays a role in improving the performance of poultry birds by their antibacterial activity and positive effect on gut morphology. The medicinal values of these plants lie in their phytochemicals to replace the use of antibiotics and also as growth promoter. Picralima nitida is a good source of phytochemicals, contain various biochemical and proffer physiological effects. The following phytochemicals were found in the Picralima nitida seed: alkaloids, tannins, cyanogenic glycosides, oxalates, saponins, and flavonoids, phenols and phytates. It is observed that when ethanol, benzene, chloroform and aqueous (cold and hot) extracts of P. nitida seed were tested against five bacterial strains: Escherichia coli, Pseudomonas aeruginosa, Bacillus subtilis (B. subtilis), Staphylococcus. aureus and Salmonella kintambo (S. kintambo). The flavonoids are simple phenolic compound that have been reported to possess a wide spectrum of biochemical activities such as antioxidant, antimutagenic, anti-carcinogenic, as well as the ability to modify gene expression. The seed is high in saponins and Tanins and very low in phenols. Saponins are high in hypocholesterolemic as well as anti-carcinogenic effect and plants alkaloid and their derivatives are medicinal because of their analgestic and anti- bacterial properties while flavonoids contain anaoxidants, antimuganeic and anti-carcinogenic effects. The presence of these mentioned phytochemicals in P. nitida seeds will confer numerous medicinal properties if included in poultry diet.

Keywords: *Picralima nitida,* Phytochemicals, growth promoters, broiler

Effet de la graine akuamma transformée (*Picralima nitida*) comme additif dans les aliments de poulet de chair

Résumé

Les résidus chimiques d'antibiotiques dans la production animale ont eu un impact négatif sur la santé humaine. L'utilisation de matières végétales en remplacement des promoteurs de croissance conventionnels chez les poulets de chair a donné des résultats dans tous les aspects de la chaîne de production de viande, tels que des améliorations de la performance du produit, de la carcasse et de la qualité de la viande. Il joue un rôle dans l'amélioration des performances des volailles par son activité antibactérienne et son effet positif sur la morphologie intestinale. Les valeurs médicinales de ces plantes résident dans leurs composés phytochimiques pour remplacer l'utilisation d'antibiotiques et aussi comme promoteur de croissance. Picralima nitida est une bonne source de composés phytochimiques, contient divers effets biochimiques et offre des effets physiologiques. Les

composés phytochimiques suivants ont été trouvés dans la graine de Picralima nitida : alcaloïdes, tanins, glycosides cyanogènes, oxalates, saponines et flavonoïdes, phénols et phytates. On observe que lorsque l'éthanol, le benzène, le chloroforme et des extraits aqueux (froid et chaud) de graines de P. nitida ont été testés contre cinq souches bactériennes : Escherichia coli, Pseudomonas aeruginosa, Bacillus subtilis (B. subtilis), Staphylococcus. aureus et Salmonella kintambo (S. kintambo). Les flavonoïdes sont de simples composés phénoliques qui possèdent un large spectre d'activités biochimiques telles que les propriétés antioxydantes, antimutagènes, anticancérigènes, ainsi que la capacité de modifier l'expression des gènes. La graine est riche en saponines et en tanins et très faible en phénols. Les saponines ont un effet hypocholestérolémique et anti-cancérigène élevé et les alcaloïdes des plantes et leurs dérivés sont médicinaux en raison de leurs propriétés analgésiques et antibactériennes, tandis que les flavonoïdes contiennent des effets anaoxydants, antimuganéiques et anti-cancérigènes. La présence de ces composés phytochimiques mentionnés dans les graines de P. nitida conférera de nombreuses propriétés médicinales si elles sont incluses dans l'alimentation des volailles.

Mots-clés : *Picralima nitida*, Phytochimiques, promoteurs de croissance, poulet de chair

Introduction

Nature has always been a blessing for the field of medicine, and peoples throughout history have used natural substances for the treatment of various diseases. The sources of natural substances can be both plants and animals, and an enormous number of pharmacologically active compounds have been derived from natural sources. Many compounds isolated from natural sources have been used as drugs for treatment purposes, either with or without modifications. Through the work of ongoing research, thousands of active compounds have been isolated from natural sources, which can be classified into multiple compound classes.

Medicinal plants are widely used in West Africa because of their natural proficiency with little or no side effects. Various plants parts such as leaves, flowers, stems, roots, seeds, fruits and bark have all been used as constituents of herbal medicines. The medicinal values of these plant parts lie in their phytochemical compositions, which produce definite physiological action on human body (Afolabi *et al*., 2007).

In the field of poultry, several researchers have worked on phytochemicals to replace the use of antibiotics and also as growth promoters. The use of plant materials as a replacement of conventional growth promoters in broilers has given results in all aspects of the meat production chain, such as improvements in product performance, carcass, and meat quality (Nidia *et al*., 2017). *Picralima nitida* is an herbal plant with numerous applications in West African unconventional medicine. Research has shown that *P. nitida* seed is a good source of phytochemicals, contains various biochemical and proffer physiological effects (Ezeamuzie *et al*., 1994). Despite the widespread abundance and numerous traditional uses of *P. nitida* plants especially the seeds in the treatment of various human diseases, no study, as at the time of this review has evaluated its use as additives in broiler feed.

Nutritional evaluation of akuamma plant

Obasi *et al*. (2012) reported that *Picralima nitida* Peels contain appreciable amount of nutrients: lipid (7.4%), protein (28.4%) and carbohydrate (37.7%) as well as moisture (10.5%) and ash (16.0%). The results of phytochemical screening of *Picralima nitida* peel revealed the presence of flavonoids, saponins, tannins, alkaloids and glycosides while phenols were absent.

Akuamma has been shown to possess

antiplasmodial, antimicrobial, anti-inflammatory, antipyretic, as well as anti-trypanosomiasis properties. Medicinally, the bark is used to prepare remedies to treat malaria and male sexual impotence, while the fruits are used for dysmenorrhoea and gastrointestinal disorder (Fakoye et al., 2000; Ezeamuzieji et al., 1994; Iwu and Klayaman.

Composition of Picralima. nitida seeds

In a study on chemical profile of *P. nitida* Seeds, Nwaogu (2016) reported high percentage composition of saponins 13.50±0.50%, flavonoids 5.50±0.40% and alkaloids 5.33±0.57%. Saponins have been shown to have hypocholesterolemic as well as anticarcinogenic effects (Koratkar and Rao, 1997). Okenfull *et al.* (1984) explains that the cholesterol lowering effect of saponins in animals and humans is caused through the formation of mixed micelles and bile acids into micellerbile acid molecules. Alkaloids derived from plants and their synthetic forms are used as medicinal agents due their analgesic and anti-bacterial properties.

Beta *et al.* (2005) reported that flavonoids are simple phenolic compound that have been reported to possess a wide spectrum of biochemical activities such as antioxidant, antimutagenic, anti-carcinogenic, as well as the ability to modify gene expression. Which means the presence of these mentioned phytochemicals in *P. nitida* seeds will confer numerous medicinal properties if included in poultry diet.

Nwaogu (2016) reported that *P. nitida* seed is rich in both essential and non-essential amino acids. For essential amino acids, the following were present in high percentage; leucine (11-83%), valine (9.76%) and phenylalanine (9.21%), while tyrosine (6.08%) and cysteine (3.92%) were the non-essential amino acids with higher percentage. Even with this, the essential and non-essential amino acids composition found in *P. nitida* are low compared to those found in melon seeds and fluted pumpkin seeds as recorded by Achinewhu (1998).

As reported by Nwaogu (2016), the seeds contain both Vitamin A (3285.70 µg/100g) and & E (123.40 µg/100g) even though they are in low concentration. Vitamin A in the seed is crucial for normal growth, development and maintenance of epithelial tissues. It is also essential for vision likewise normal bone and teeth development. In addition, application of these seeds to poultry diet might help alleviate vitamins A and E deficiencies.

In Nwaogu (2016) study of akuamma seeds chemical profile, he reported that the seeds contain sodium, potassium, magnesium, calcium, selenium, and phosphorus though at very low percentage. But iron, zinc and manganese are present in high percentage. Talwar *et al*., (1989) made it known that iron, zinc, manganese and selenium help to strengthen the immune system. Iron is also known as an important component of heamoglobin necessary for oxygen transport.

Similarly, Chaturvedi *et al*. (2004) reported that manganese, zinc and selenium are known to prevent muscle degeneration, growth retardation, immunologic dysfunction, gonadal atrophy, impaired spermatogenesis and bleeding disorder

Antibiotics activity of Pricalima nitida

Obasi *et al.,* (2012) confirmed the antibiotics properties of akuamma peel, it stated that it inhibited the growth of *Escherichia coli* and *Staphylococcus aureus* while great effect was observed in *E. coli*. Erharuyi *et al*. (2014) observed that when ethanol, benzene, chloroform and aqueous (cold and hot) extracts of *P. nitida* (seed, stem bark and root) were tested against five bacterial strains: E. coli, P. aeruginosa, Bacillus subtilis (B. subtilis), S. aureus and *Salmonella kintambo (S. kintambo)*. The result shown that all tested organisms were sensitive to the ethanol extracts of the root and stem bark and

highest inhibiting activity was observed in *S. kintambo*. They also observed that the cold-water extract of the seed was active against all the bacterial strains except *S. kintambo*, while there was highest activity against *B. subtilis*. The hot water seed extract had activity only against *S. aureus* and *B. subtilis*. No activity was observed in benzene and chloroform extracts. Lastly, the methanol extract of the stem bark of *P. nitida* was revealed to exhibited significant antimicrobial activity against a wide range of Gram-positive bacteria and fungi, but limited activity against Gram-negative.

Anti-fungal activity of P. nitida

The anti- fungal properties *P. nitida* was also discovered by (Erharuyi *et al*, 2014). P. nitida were assessed in three fungal species: *Aspergillus flavus*, *C. albicans* and *Microsporum*. The result revealed that both the aqueous and ethanol leaf extracts exerted antifungal effect on *Aspergillus flavus* and *C. albicans* in a dose-dependent manner, but there was no antifungal effect seen in *Microsporum canis.*

Processing methods of P. nitida seed

The most common way of consuming the hard seed is by grinding it into fine powder. The fine powder is often added to food like pap or taken as an infusion – just like taking tea. The seeds are widely used in West Africa especially in Nigeria, Cote d'ivoire and Ghana as antipyretic, aphrodisiac, for the treatment of malarial, pneumonia and other chest-conditions (Erharuyi *et al*, 2014). In Gabon, the seeds are applied externally for the treatment of abscesses. *Picralima nitida* seeds, can be dried and stored for 0.5-2 years without loss of pharmacological activity.

Anti-nutritional factor

Three anti-nutritive factors are said to be found in akuamma seeds according to Nwaogu (2016), they are; oxalate, phytate and cyanogenic glycosides. Their presence in the seed makes it toxic. But they are found in low concentration. Nwaogu (2016) further reports that cyanogenic glycoside concentration in the seeds (3.39±0.03%) is lower than the dose (36mg/100DM) considered to be lethal to man – this is not known about poultry. Phytate concentration (0.17±0.004%) according to Nwaogu (2016) is also said to be low. As high concentration of phytate affects digestibility.

Conclusion

The phytochemicals found in the *Picralima nitida* seed (alkaloids, tannins, cyanogenic glycosides, saponins, flavonoid, phenols) are essential component needed in the body system of broilers for effective production and performance that impact improvements in product performance, carcass, and meat quality.

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