# COMPARATIVE ANALYSIS OF NUTRIENTS AND PHYTOCHEMICALS OF LEMON GRASS (*Cymbopogon citratus*), BITTER LEAF (*Vernonia amygdalina*) AND THEIR BLENDS

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**ABSTRACT**

*This study aimed to evaluate and compare nutrients and phytochemical of lemon grass, bitter leaf and their blends. Samples of lemon grass (10g), bitter leaf (10g) and their blends (5g each) were collected and analysed for proximate and phytochemical composition, The data sets generated were analyzed using Statistical Analysis System (SAS, 2002) software package. Means were compared using LSD in a completely randomized design (CRD). Proximate analysis of the extracts showed that crude protein (4.36-9.45), crude fibre (2.10-5.76), crude fat (12.00-24.50), ash (2.76-4.99), soluble carbohydrates (33.01-72.92) and the values were affected (P< 0.05) by the blends of lemon grass and bitter leaf. The phytochemicals were not significantly affected (p0.05) by the blends of lemon grass and bitter leaf. Considering the higher crude protein, crude fibre, crude fat, ash, soluble carbohydrates and mixtures of phytochemicals in the blend of lemon grass and bitter leaf compared to lemon grass and bitter leaf alone, it is recommended for farmers to use the blend of lemongrass and bitter leaf as source of additive for in vivo feed trials to utilize the nutrients and phytochemicals in them.*

**Keywords:** Nutrients, Phytochemicals, Lemon grass, Bitter leaf, Blends

## INTRODUCTION

Growth promoters are commonly added to chicken feed to enhance appetite, improve feed conversion, stimulate the immune system and regulate intestinal microflora among other benefits. (Kiani *et al*., 2022). Traditional medicine is known for its antibacterial, antifungal, antiparasitic, antiviral, antioxidant, anti- cholesteremic, anticancer and vasodilatory properties. Herbs, spices and plant extracts can be valuable alternatives for the health and nutrition of poultry chickens (Maidala, 2017). Lemon grass (member of the family Poaceae) is a perennial grass which is evenly dispersed and found in every region. Lemongrass possesses high therapeutic potential due to phytochemicals, such as plant sterols, flavonoids, lignans, carotenoids, terpenoids, saponins, sulfides, and fiber, which play a preventive role in oxidative damage and various human diseases. The essential oil extracted from lemongrass has applications in perfumes, cosmetics, the soap industry, and insect repellent. Lemongrass has a major bioactive component with many types of therapeutic potential, including anti-cancer, anti-hypertensive, and anti-mutagenicity (Thorat *et al*., 2017). Vernonia amygdalina is an angiosperm belonging to Asteraceae family, is grouped under the genus Vernonia, and species amygdalina. Phytochemistry/bioactive compounds of Vernonia amygdalina L Alabi *et al*. (2021). reported several flavonoids (luteolin 7-O-b-glucuronide, luteolin 7-O-b-glucoside) in V. amygdalina ethanolic preparations. All three flavones have strong antioxidant properties, particularly luteolin (3′,4′,5,7 tetrahydroxyflavone). Other phytochemicals present include alkaloids, anthraquinone, steroid, phenol, phytate, oxalate, cyanogenic glycoside, tannins and saponins (Alabi *et al*., 2021). The blend of lemon grass and bitter leaf can be a good combination in providing nutrients and phytochemicals in livestock production. This study exploits the potentials of blend of lemon grass and bitter leaf than when lemon grass and bitter leaf is used alone.

## MATERIALS AND METHODS

### Sample collections

Fresh leaves of lemon grass and bitter leaf were collected from Federal University Gashua Yobe State, Nigeria. Samples were collected of lemon grass (10g) and bitter leaves (10g) and blend of lemon grass and bitter leaf (5g each) for proximate and phytochemical analysis.

### Determination of Proximate Composition

The proximate composition of *Vernonia amygdalina* leaf was determined using standard laboratory method to determine carbohydrates, fats, ash contents, dry matters, crude proteins, and crude fibre (AOAC, 1990).

### Quantitative Analysis

The phytochemical constituents of the samples were determined using the procedures of Sofowora *et al*., (1982). The data sets generated for proximate and phytochemical analysis were analyzed using Statistical Analysis System (2002) software package. Means were compared using LSD.

### Results and Discussion

The proximate composition of lemon grass, bitter leaf and the blend of lemon grass and bitter leaf is shown in Table 1. The crude protein of lemon grass (4.36%) is relatively lower than that of bitter leaf (6.70%) and the blend of lemon grass and bitter leaf (9.45%) (P<0.05). The value of crude protein of lemon grass reported in this work agrees with the earlier report of Asaolu *et al*. (2009) who reported (4.56%), the value of crude protein of

bitter leaf is lower than the earlier report of Ali *et al*., (2020) who reported (28.20% CP) in bitter leaf. The blend of lemon grass and bitter leaf gave a higher crude protein (9.45%) (P<0.05) value and this is advantageous because higher crude protein values mean high growth rate, production of hormones, body defense and production. The crude fibre of lemon grass (4.65%) is higher than that of bitter leaf (2.10%) reported in this work and (5.76%) in the blend of lemon grass and bitter leaf (P<0.05). Crude fibre stimulates gut movement, clear carcinogenic cells and reduces the absorption of excess cholesterol in the body. The crude fat of lemongrass (12.00%) reported in this work is lower than (21.00%) in bitter leaf and (24.50%) (P<0.05) and in blends of bitter leaf and lemon grass. The values of crude fat of lemon grass reported in this work is higher than (4.34%) reported by Usunomena and Okolie, (2016) and the value of crude fat of bitter leaf reported in this work is lower than (36.05%) reported by Asaolu *et al*. (2009). The ash content of lemon grass (2.76%), bitter leaf (3.81%) differs significantly (P<0.05) with the blends of lemon grass and bitter leaf (4.99%). The ash content of lemon grass reported in this work is within the value of (2.94%) reported by Thorat *et al*. (2017), the ash content of bitter leaf is lower than (15.20%) reported by Udochukwu *et al*. (2015). The carbohydrates content of bitter leaf (33.01%) was lower than that of lemon grass (33.01%) and blend of lemon grass and bitter leaf (72.92%). The energy content of lemon grass, bitter leaf and their blends will add to calorific value of the diet to be given to animals.

**Table 1: Proximate composition (%) of Lemon grass/Bitter leaf blends**

| Parameters | Blend of lemon grass and Bitter leaf | Bitter leaf | Lemon grass | SEM |
|---|---|---|---|---|
| Dry matter | 94.60 | 92.10 | 92.00 | $2.60^{NS}$ |
| Crude protein | $9.45^{a}$ | $6.70^{b}$ | $4.36^{c}$ | 5.09* |
| Crude fibre | $5.76^{a}$ | $2.10^{b}$ | $4.65^{a}$ | 3.66* |
| Crude fat | $24.50^{a}$ | $21.00^{b}$ | $12.00^{c}$ | 12.50* |
| Ash | $4.99^{a}$ | $3.81^{ab}$ | $2.76^{b}$ | 2.23* |
| Carbohydrates | $72.92^{a}$ | $33.01^{c}$ | $67.91^{b}$ | 39.01* |

$^{abc}$ Means of three (3) determinations, SEM= Standard Error of Means, NS=Not significant. Means bearing different superscripts in the same row are statistically different (P<0.05).

The phytochemical analysis of lemon grass, bitter leaf and their blends is shown in Table 2. Quantitative screenings showed that amount of phytochemicals; alkaloids (1.00-3.35 µg/ml), phenols (0.01-2.50 µg/ml), phytate (1.20-2.60 µg/ml), saponins 91.51-2.21 µg/ml), flavonoids (0.11-0.70 µg/ml), anthocyanins (0.18-0.25 µg/ml), caratenoids (0.27-0.45 µg/ml), terpenoids (0.21-0.28 µg/ml) and lignans (1.41-2.34 µg/ml), all the values were statistically similar (P>0.05), the blends does not exert any effects on the phytochemical composition of lemon grass and bitter leaf. Each of these phytochemicals is known for its various protective and therapeutic effects. The above phytochemicals were reported by Shendurse *et al*. (2021) in lemon grass and Ofongo *et al*. (2021) and Alabi *et al*. (2021) in bitter leaf.

**Table 2: Phytochemical screening of lemon grass, bitter leaf and their blend**

| Parameters | Blend of lemon grass and Bitter leaf | Lemon grass | Bitter leaf | SEM |
|---|---|---|---|---|
| Alkaloid (µg/ml) | 3.50 | 1.04 | 1.00 | $2.50^{NS}$ |
| Phenols ((µg/ml) | 2.50 | 0.01 | 0.01 | $2.40^{NS}$ |
| Phytate (µg/ml) | 2.60 | 1.62 | 1.20 | $1.20^{NS}$ |
| Saponins (µg/ml) | 1.60 | 2.21 | 1.51 | $1.49^{NS}$ |
| Flavonoids (µg/ml) | 0.70 | 0.18 | 0.11 | $0.52^{NS}$ |
| Anthocyanins (µg/ml) | 0.25 | 0.18 | 0.20 | $0.10^{NS}$ |
| Carotenoids (µg/ml) | 0.45 | 0.28 | 0.27 | $0.20^{NS}$ |
| Terpenoids (µg/ml) | 0.21 | 0.28 | 0.28 | $0.09^{NS}$ |
| Lignans (µg/ml) | 2.34 | 1.41 | 1.86 | $1.24^{NS}$ |

Means of three (3) determinations, SEM= Standard error of means, NS=Not significant

## CONCLUSION AND RECOMMENDATION

Considering the higher crude protein, crude fibre, crude fat, Ash, soluble carbohydrates and mixtures of phytochemicals in the blend of lemon grass and bitter leaf compared to lemon grass and bitter leaf alone. It is recommended for farmers to use the blend of lemongrass and bitter leaf as source of feed additives for in vivo feed trials to utilize the nutrients and phytochemicals in them.

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