

## Performance and Egg Quality Response of Laying Birds Placed on Sunflower (*Tithonia Diversifolia*), Catmint (*Nepeta Racemosa*) and Bitterleaf (*Vernonia Amygdalina*) Aqueous Extracts

Rafiu Tirimisiyu Adewale<sup>1</sup>, Okanlawon Eden Olusegun<sup>2\*</sup>, Olayeni Tunji Babatunde<sup>3</sup>, Adeleke Mayowa Grace<sup>4</sup>, Sangoniyi Olakiitan<sup>5</sup>  
Ladoke Akintola University of Technology Ogbomoso

**Corresponding Author:** Okanlawon Eden Olusegun [edenokanlawon@gmail.com](mailto:edenokanlawon@gmail.com)

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### ABSTRACT

The effect of aqueous sunflower leaf, catmint and bitter leaf extract on the performance and egg quality characteristics of laying birds were investigated. 162 Isa brown layers were involved in a Completely Randomized Design experiment. They were randomly allocated into six treatments. Each treatment was replicated thrice at 9 birds per replicate. Treatment 1 (control treatment) contained clean drinkable water with no aqueous extract added, Treatment 2 contained sunflower and bitter leaf extract administered at 15ml each per liter of drinking water, Treatment 3 contained sunflower and catmint leaf extract administered at 15ml each per liter of drinking water, Treatment 4 contained catmint and bitter leaf extract administered at 15ml each per liter of drinking water, Treatment 5 contained sunflower, catmint and bitter leaf extract administered at 10ml each per liter of drinking water and Treatment 6 contained sunflower, catmint and bitter leaf extract administered at 15ml each per liter of drinking water. Egg quality parameters measured include egg weight, egg length, yolk height, albumen weight, shell weight and shell thickness. Performance parameters measured include number of eggs produced daily as well as feed intake. The result obtained revealed that there was no significant difference in the egg quality parameters except in the performance characteristics where Hen Day Production, Feed/12 eggs and Feed/30 eggs showed significant difference ( $P>0.05$ )

## **INTRODUCTION**

There are risks to human health as a result of the chicken industry's widespread use of antibiotics to boost productivity. Natural herb-based poultry feed is increasingly being used as a feed supplement and as a potent antibiotic replacement (Mahanta et al., 2017). Animal scientists have spent the past few years looking for herbal resources that can increase poultry production without posing any health risks (Dhama et al., 2015; Laudadio et al., 2015). Higher consumer awareness on poultry products that are free from chemical residues such as antibiotics has resulted in global impact (Wolfenden et al., 2010).

In light of this, producing organic eggs is crucial for the safety of the general public. Because organic eggs are in great demand due to public health concerns, modern farmers are always searching for more cost-effective ways to produce organic eggs in order to better meet market needs. Since the use of antibiotics as growth promoters in poultry diets has just been outlawed, bitter leaves, catmint, and sunflower leaves may be suitable alternatives.

## **LITERATURE REVIEW**

*Vernonia amygdalina*, *Nepeta racemosa* and *Tithonia diversifolia* are good sources of antibiotics which help to improve growth performance and health benefit of birds. *Vernonia amygdalina* plant has gained particular attention recently as it was discovered to have a number of therapeutic benefits, including anti-cancer effects (Howard et al., 2006; Oyugi et al., 2009), anti-fungal (Erasto et al., 2006), anti-malarial and anthelmintic properties (Abosi and Raceroka, 2003). Also, there are many reported health benefits and uses of catmint and sunflower as herbal supplement. It's a great research interest combining the three phytobiotics in order to form a complimentary action in improving egg laying performance and egg quality

## **METHODOLOGY**

### **Experimental Site**

The experiment was carried out at Ladoke Akintola University of Technology's Poultry Unit of the Teaching and Research Farm in Ogbomoso, Oyo State, Nigeria. *Nepeta racemosa*, *Vernonia amygdalina*, and *Tithonia diversifolia* fresh leaves were gathered from the LAUTECH Teaching and Research Farm.

### **Preparation of Test Ingredient (Sunflower, Catmint and Bitterleaf Aqueous Extracts)**

The leaves were destalked, allowed to air dry for seven days, and then exposed to the sun for half an hour to give them a crispy texture. After being sun-dried, the materials were manually ground into a powder and kept in an airtight container until they were needed. To obtain the extract, 50g of each test item was steeped in one liter of cold water for twenty-four hours. The extract was then filtered through a screen.

### **Experimental animals and Management**

A total of 162 laying Isa brown birds were employed. Three treatments, each consisting of 27 birds, were randomly and evenly assigned to the birds. Three birds per cell were utilized to house the treatments, which were subsequently separated into three duplicates of nine birds each. Clean drinkable

water without any aqueous extract added was used in Treatment 1 (control treatment). In Treatment 2, 15 milliliters of each of the bitter leaf and sunflower extracts were added to one liter of drinking water. In Treatment 3, 15 milliliters of sunflower and catmint leaf extract were added to each liter of drinking water. Catmint and bitter leaf extract were added to Treatment 4 at a rate of 15 milliliters per liter of drinking water. Sunflower, catmint, and bitter leaf extracts were added to Treatment 5 at a rate of 10 milliliters per liter of drinking water. Sunflower, catmint, and bitter leaf extracts were added to Treatment 6 at a rate of 15 milliliters per liter of drinking water.

#### **Data collection**

Egg production performance: at the end of each day and week, the following parameters were determined:

- Feed intake (g) is equal to feed given minus feed leftovers.
- Production percentage per day: This was computed using the formula: %  
Day production = Total number of eggs produced x 100.

#### **Total Quantity of Laying Birds**

The price of feed for each egg tray:

Feed consumption per 30 eggs multiplied by the cost per kilogram of feed equals the cost per tray.

30 eggs are produced by feeding 30 people = feed intake/number of eggs produced x 30.

Analysis of Egg Quality: The parameters listed below were identified during the analysis of the eggs.

The sensitive weighing scale was used to determine the weight of the egg. Each egg sample was weighed separately, and the average weight was calculated.

Egg Dimension: A Vernier caliper was used to measure this in centimeters. Three distinct locations were used to measure width: the center, the narrow end, and the broad end.

Shell Weight: After the shell membrane was broken and removed, it was measured in grams using a sensitive scale.

Shell Thickness: The thickness at the broad, middle, and narrow ends was measured using a micrometer screw gauge, and the average was calculated in millimeters.

Albumen Height: The albumen's height was measured using a spherometer.

The weight of the albumen was ascertained following the removal of the egg. Each egg sample was weighed separately, and the average weight was calculated.

Egg Dimension: A Vernier caliper was used to measure this in centimeters. Three distinct locations were used to measure width: the center, the narrow end, and the broad end.

#### **Statistical analysis**

All data collected was subjected to a one-way analysis of variance (ANOVA) using SPSS 2010. All means that are significant are separated using Duncan's multiple range test of the same software.

**RESULTS**

Table 1 shows the egg quality characteristics of laying birds placed on sunflower leaf, catmint leaf and bitter leaf aqueous extracts. Result obtained from table 1 revealed that all egg quality parameters were not significantly different ( $p>0.05$ ). Though the egg weight was influenced no definite trend was followed, likewise the yolk proportion. As the inclusion level rose to 6 g/kg feed, the Haugh unit dramatically increased. The shell surface area is the same. This suggests that the aqueous extracts of sunflower, catmint, and bitterleaf have a beneficial effect on egg quality, which is consistent with the findings of Amir et al. (2022), who found that laying hens supplemented with turmeric produced better-quality eggs than the control group and also (Olayeni et al., 2024) The phytochemical in the test ingredient may be responsible for the numerical increase in egg quality observed in layers fed a meal comprising a blend of turmeric and Jimson weed. The primary constituents of aqueous extracts of sunflower, catmint, and bitterleaf may enhance the uterine environment (the location of calcium deposition) and hence improve the quality of eggs. Taking into mind the active elements and the phytochemical in sunflower, catmint and bitterleaf aqueous extract (steroid) that could be a factor responsible for higher performance since it assists in reproductive performance. This outcome is also consistent with the findings of Nemati et al. (2021), who found that adding a phytobiotic blend of garlic and ginger to layers' diets enhanced their haugh units and that adding *Allium sativum* to laying hens' feed improved their daily egg production, weight, and shell thickness, as well as providing a positive alternative for productivity and egg quality as reported by (Ogbuewu et al., 2021 and Edmundo et al., 2022).

Table 1. Egg Quality Characteristics of Laying Birds Placed on Sunflower Leaf, Catmint Leaf and Bitter Leaf Aqueous Extracts

<b>Parameter</b>	<b>T1</b>	<b>T2</b>	<b>T3</b>	<b>T4</b>	<b>T5</b>	<b>T6</b>	<b>SEM</b>
Egg Weight	50.11	55.01	55.74	57.18	55.72	57.47	0.40
Shell Thickness	0.55	0.57	0.58	0.55	0.56	0.53	0.01
Yolk Index	0.45	0.45	0.45	0.45	0.44	0.45	0.01
Egg Surface Index	1.42	1.02	1.05	1.05	1.03	1.04	0.13
Shell Surface Area	71.32	70.39	71.00	72.21	70.97	72.44	0.34
Haugh Unit	70.61	70.44	70.49	70.59	70.68	70.51	0.04
Yolk %	28.42	26.80	26.05	25.61	26.31	27.18	0.65
Albumen %	58.00	59.20	57.87	59.25	59.60	59.47	0.54
Shell %	10.46	11.07	10.77	10.70	10.51	10.32	0.21

<sup>ab</sup> means along the same row with different superscripts are significantly different ( $P<0.05$ )

T1=Control (no aqueous extract added to drinking water)

T2=Sunflower and bitter leaf extracts (15ml per liter of drinking water)

T3=Sunflower and catmint leaf extracts (15ml per liter of drinking water)

T4= Catmint and bitter leaf extracts (15ml per liter of drinking water)

T5= Sunflower, catmint and bitter leaf extracts (10ml per liter of drinking water)

T6= Sunflower, catmint and bitter leaf extracts (15ml per liter of drinking water)

Result obtained from Table 2 showed the performance characteristics of layers placed on sunflower, catmint and bitterleaf aqueous extracts. The difference between the hen day production, feed/12 eggs, and feed/30 eggs was significant ( $p < 0.05$ ). The highest ( $P < 0.05$ ) hen day production was recorded by layers placed on T6 sunflower, catmint, and bitter leaf extracts (15ml per liter of drinking water) (87.59), while the lowest was recorded by layers placed on T2 sunflower and bitter leaf extracts (15ml per liter of drinking water) (71.99). The highest ( $P < 0.05$ ) feed/12 eggs and feed/30 eggs (1777.17), (4442.93), and the lowest was recorded by layers placed on T6 sunflower, catmint, and bitter leaf extracts (15ml per liter of drinking water) (1458.52) and (3646.30), respectively.

In relation to hen day production, T6 was found to perform at its best. Hen day production values were lower in birds in other treatments, which was consistent with research by Durunna et al. (2011) and Tangka (2003) that showed better growth performance in animals given bitter leaves. The findings of Okanlwon et al. (2024), who documented the advantageous growth-enhancing synergistic effects of phytobiotics, were also corroborated. It's possible that a combination of these herbs has regulated the growth and colonization of many pathogenic and nonpathogenic bacterial species in the gut, improving the production of chymotrypsin and other gastrointestinal enzymes. It was shown that Treatment 2 used the most feed to produce 12 eggs in the feed/12 egg experiment. T6 laid 12 eggs with the least amount of nourishment. Hens placed on sunflower and bitter leaf exclusively at 15ml each per liter of drinking water, absorbed the greatest feed. The presence of antinutritional substances such cyanide, oxalate, trypsin inhibitor (Ingale and Shrivastava, 2011), phytic acid, and tannin (Gandhi et al., 2008) may be the cause of this. These substances prevent feed from being used for optimal production and theIt was shown that Treatment 2 used the most feed to produce 12 eggs in the feed/12 egg experiment. T6 laid 12 eggs with the least amount of nourishment. This study also presents the complementary action of the sunflower, catmint and bitterleaf aqueous extracts to improves the productive performance of layers by an reducing the total feed consume to produce 12 an 30 eggs.

Table 2. Performance Characteristics of Layers Placed on Sunflower, Catmint and Bitterleaf Aqueous Extracts

Parameter	T1	T2	T3	T4	T5	T6	SEM
Hen Day Production	82.33 <sup>a</sup>	71.99 <sup>b</sup>	76.09 <sup>b</sup>	77.39 <sup>ab</sup>	81.48 <sup>ab</sup>	87.59 <sup>a</sup>	1.23
Daily Feed Intake	105.74	105.42	105.42	105.89	105.63	105.37	0.48
Feed/12 eggs	1551.11 <sup>b</sup>	1777.17 <sup>a</sup>	1697.82 <sup>a</sup>	1654.85 <sup>ab</sup>	1563.19 <sup>ab</sup>	1458.52 <sup>b</sup>	31.59
Feed/30 eggs	3877.77 <sup>b</sup>	4442.93 <sup>a</sup>	4244.56 <sup>a</sup>	4137.12 <sup>ab</sup>	3907.99 <sup>ab</sup>	3646.30 <sup>b</sup>	78.974

<sup>ab</sup> means along the same row with different superscripts are significantly different ( $P < 0.05$ )

T1=Control (no aqueous extract added to drinking water)

T2=Sunflower and bitter leaf extracts (15ml per liter of drinking water)

T3=Sunflower and catmint leaf extracts (15ml per liter of drinking water)

T4= Catmint and bitter leaf extracts (15ml per liter of drinking water)

T5= Sunflower, catmint and bitter leaf extracts (10ml per liter of drinking water)

T6= Sunflower, catmint and bitter leaf extracts (15ml per liter of drinking water)

## CONCLUSIONS AND RECOMMENDATIONS

It can be concluded that birds placed on sunflower, catmint and bitter leaf aqueous extract at 15ml each per liter of drinking water increased the egg production and showed no negative effect in terms of the health of the birds. The birds consumed the least feed to produce 12 eggs as well as 30 eggs, making the production cost of T6 lesser when compared to other treatments. In addition, the aqueous extract had no negative effect on egg quality characteristics.

Hence, it is therefore recommended that the mixture of sunflower, catmint and bitter leaf aqueous extract at 15ml each per liter of drinking water can be recommended for optimum performance of laying hens

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