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## **POTENTIALS OF *Mentha piperita* (L.) and *Azadirachta indica* (A. Juss.) LEAVES AS NUTRITIONAL SUPPLEMENTS FOR GROWTH PROMOTION IN BROILER CHICKENS**

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### **ABSTRACT**

**Medicinal plants are used in many ways by different environments and cultures; some are used for growth promotion in Broiler chickens. This research was conducted to evaluate *Azadirachta indica* (Neem) and *Mentha piperita* (Mint) for growth promotion in broiler chickens. Toxicity of the two plant extracts was tested on mice, all the rats survived the two phases, rendering the plant samples nontoxic and safe for consumption. Fifty (50) day- old broiler chickens were divided into 5 experimental units of 10 chicks each. Commercially formulated broiler starter and finisher rations were offered from 0-4 and 4-6 weeks of age. Authenticated samples of the plant materials were dried in shade, pulverized and mixed with 1g and 5g/ kg of feed. The experimental treatments comprised of the control (containing no feed additive), 1g of Neem per kg of feed, 5g of Neem per kg of feed, 1g of Mint per kg of feed and 5g of Mint per kg of feed. Data regarding feed intake, live weight were recorded on weekly basis and mortality was also recorded accordingly. Weight gain was calculated on weekly basis by subtracting weight of the respective week from the last week's weight. At the end of the experiment, no significant difference was observed ( $P < 0.05$ ) on the chickens fed with 1g/kg of *Mentha piperita* where as significant difference was observed in the remaining treatments. It was concluded from this research that *Azadirachta indica* and *Mentha piperita* can be used as nutritional supplements for growth promotion in Broiler Chickens.**

**Key words: Mint leaves, Neem leaves, Feed supplements, Growth and Broiler chickens**

### **INTRODUCTION**

The use of intricate poultry production systems has led to marked increase in the production of poultry meat and eggs throughout the world (Armstrong, 2006). This has triggered the discovery and widespread use of a number of "feed additives". The term feed additive is applied in a broad sense, to all products other than those commonly called feedstuffs, which could be added to the ration with the purpose of obtaining some special effects (Feltwell and Fox, 1999). The main objective of adding feed additives is to boost animal performance by increasing their growth rate, feed conversion efficiency, livability and lowered mortality. These feed additives are termed as "growth promoters".

Growth promoters can be chemical products, antibiotics and enzymes etc. They play an active role in the experimental and commercial production of animals as well as poultry. Supplementation of various growth promoters from different sources to poultry feed is nowadays common and widely used, this help to improve the utilization of nutrients (Griggs & Jacob, 2005). Although, good results were

obtained with these substances, their use might have unfavorable effect (Public health hazards or environmental pollution) on the other side, in production of residual problems in the tissues of birds and animals. However, recently many countries tend to prevent application of antibiotics for their side effects on both bird and mankind (Henry *et al.*, 2001). It is indispensable to minimize these components, and deal with replacers without any adverse effect on production, so it is important to use natural growth promoters (Ocak *et al.*, 2008).

Medicinal plants have been used since centuries to treat various diseases in man and animals. It is not surprising, therefore, that several herbal agents have been empirically used in poultry birds and other animals. The plants were selected for their potential benefits to birds' appetite, digestion, immunity and antibacterial activities. Neem (*Azadirachta indica*), popularly known as Indian neem or Indian lilac of the family *Maliaceae*, is one of such non-conventional and available ingredients sources in the tropics with great potential in the 21<sup>st</sup> century.

It is a tropical tree plant which is widely distributed in Africa, and available all year round (Ganguly 2014). The tree is well adapted to the climatic and soil conditions in the tropical rainforest regions, all the way to the Sahel savannah part of Nigeria. The leaves are very bitter to taste, and possess a garlic-like smell.

*Azadirachta indica* leaves also contain compounds with proven antimicrobial activity (Makeri *et al.*, 2007). Studies on the effects of neem on poultry production especially of broilers and laying hens also exist (Obun *et al.*, 2013). Antimicrobial studies on the effects of neem leaves and their extracts on cultured micro-organisms *in vitro* have also been carried out (Koono and Budida, 2011).

*Mentha piperita* (Mint) are aromatic, almost exclusively perennial herbs, that are widely distributed and can be found in many environments (Brickell, 2002) Menthol is a genus of about 25 species (and many hundreds of varieties) of flowering plants in the family Lamiaceae.

The main medicinal action of the leaves of mint depend on the abundant volatile oil, which has been found to contain a hydrocarbon, thymol and higher oxygenated compounds (Savithri *et al.*, 2002).

This study was carried out to evaluate the possible growth enhancer effects of *Mentha piperita* and *Azadirachta indica* leaves, in broiler chickens. Also, to test toxicity of these two plants, to find out whether it is safe for the chickens and also for humans to consume the broiler meat.

## MATERIALS AND METHODS

### Study Area

This study was carried out at a poultry farm located at Dausayi, Ungogo local government, Kano state. Which is located at latitude 12°00'38.1" N, and longitudes 8°25'50.7" E while the toxicity studies were carried out at Mallam Aminu Kano, Teaching Hospital (AKTH).

### Samples Collection and Identification

Leaves of *Azadirachta indica* and *Mentha piperita* were picked freshly directly from their respective healthy standing trees at the premises of Bayero University, Kano. Samples of leaves obtained were authenticated and voucher specimen kept at the Herbarium of Plant Biology Department, Bayero University, Kano, Nigeria.

### Sample Preparation

The fresh leaves samples were washed thoroughly under tap water, air dried under shade at room temperature. The leaves were grounded into powder using pestle and mortar, and then all samples stored separately in paper bags.

## Selection of Experimental Birds

Broiler chickens from Zartech (day old) chicks were purchased from the company agent. A total of 50 chicks were used for this experiment. They are white in color and are at a stable health condition.

The chicks were divided into 5 experimental units of 10 chicks each at two different concentrations (1g/kg and 5g/kg). These experimental units were randomly allotted to 3 treatments (T1 = *Mentha piperita*, T2= *Azadirachta indica*, T3= control). The brooding temperature was maintained at 35°C during 1<sup>st</sup> week. It was then gradually lowered by 3°C every week until it reaches room temperature (i.e. 25±1°C). The hall, where the chickens are raised was adequately demarcated to occupy the respective treatment groups.

## Collection and Preparation of Food Supplements

Commercially formulated broiler starter and finisher rations were purchased from vital feeds. Sample plants were mixed at 1g/kg & 5g/kg of feed and offered to the chicks of the respective treatment groups. A basal diet with no additives considered as control (C), Feed and water were provided *ad libitum* throughout the experiment.

## Experimental Design

This experimental design used for this experiment was complete randomized design (CRD) and 5 experimental groups of 10 chicks each is formed as stated below:

Group 1= 10 Chickens treated with 5g of *Mentha piperita* / kg of feed

Group 2= 10 Chickens treated with 1g of *Mentha piperita* / kg of feed

Group 3= 10 Chickens treated with 5g of *Azadirachta indica* / kg of feed

Group 4= 10 Chickens treated with 1g of *Azadirachta indica* / kg of feed

Group 5=10 Untreated chickens (control group)

## Data Collection

Data regarding feed intake, live weight were recorded on weekly basis and mortality was also recorded accordingly. Weight gain was calculated on weekly basis by subtracting weight of the respective week from the last week's weight. Feed conversion ratio FCR was calculated by dividing the feed intake by weight gain.

## Acute Toxicity Studies

Lorke method (1983) was adopted for the acute toxicity test in rats. Two phases consisting of Thirteen (13) of male animal species (*Rattus norvegicus*) were used. In the 1<sup>st</sup> phase, nine (9) rats in 3 groups each of 3 animals per group for the three graded doses of 10,100 and 1000mg/kg were treated orally per body weight observed for

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24hrs for signs of changes in the behavioural pattern and/or death. In a 2<sup>nd</sup> phase of the experiment, the remaining 4 rats in each of the 4 groups of one animal per group respectively were given lower or higher doses of neem and mint leaves depending on the occurrence of death or no death in the first phase and observed again for 24hrs. The oral median lethal doses were then calculated as geometric mean of the highest non-lethal and the lower lethal doses as follows:

LD<sub>50</sub> = Maximum non-lethal dose × Minimum lethal dose for both animal species (Lorke, 1983).

**RESULTS AND DISCUSSIONS**

**Acute toxicity study**

Table 1 shows the result of acute toxicity studies after oral administration of methanolic leaf extracts of *Mentha piperita* and *Azadirachta indica*. The first phase was survived by the rats (no death) paving way for the second phase of doses. The result showed no mortality, stress or abnormal behavioural changes in any of the animals at the given concentrations.

**Table 1: Acute toxicity studies of methanolic extracts of *Mentha piperita* and *Azadirachta indica***

Experiment	Dose (mg/kg)	Number of dead rat after 24 hours	
		<i>Mentha piperita</i>	<i>Azadirachta indica</i>
Phase 1	10	0/3	0/3
	100	0/3	0/3
	1000	0/3	0/3
Phase 2	1600	0/1	0/1
	2900	0/1	0/1
	5000	0/1	0/1

The Acute Toxicity Test, median lethal dose (LD<sub>50</sub>) test of the extracts of *Azadirachta indica* and *Mentha piperita* leaves was carried out orally in rats as shown in table 1, The toxicity test was done in order to ensure that these plants will not harm the chickens and that the meat of the broiler chickens will be safe for consumption by man after feeding them the leaves of neem and mint for enhancement of their growth. The LD<sub>50</sub> was found to be greater than 5000 mg/kg when administered orally in rats (Table 1) and all the animals remained alive and did not manifest any significant visible signs of toxicity at these doses. These studies showed that the extracts of *Azadirachta indica* and *Mentha piperita* leaves are practically non-toxic when administered using the oral route. This result is in agreement with Olorunisola *et al.* (2012); Parasuraman *et al.* (2014) and Adesegun *et al.* (2016) that reported acute toxicity of plants could be considered

practically nontoxic and safe above oral administration of 5000 mg/kg. However, Maikai *et al.* (2008); Obidike and Salawu (2013) concluded that, further toxicity assay should be carried out in order to reveal possible long term toxicity effects on the physiology and organs for proper recommendation on its utilization.

**Experimental Birds**

The results shown in Table 2, 3 and 4 shows the effects of experimental diets on average weight gain, average feed intake and feed conversion ratio. The data regarding feed intake, weight gain, and feed conversion ratio were significantly different in broilers fed various levels of *Mentha piperita* and *Azadirachta indica* leaves. There is variation in the feed conversion ratio of all the groups. The feed intake is almost the same in all the treatment groups throughout the experiment.

**Table 2: Effects of Experimental Diets on Average Feed Intake (g) of Broiler Chickens**

	First 10 Days	Second 10 Days	Third 10 Days
Control	0.631	0.921	1.186
Neem(1g/kg)	0.632	0.924	1.189
Neem(5g/kg)	0.634	0.927	1.19
Mint(1g/kg)	0.589	0.911	1.184
Mint(5g/kg)	0.509	0.914	1.186

**Table 3: Effects of Experimental Diets on Average Weight Gain (g) of Broiler Chickens**

	First 10 Days	Second 10 Days	Third 10 Days
Control	0.28	0.39	0.745
Neem(1g/kg)	0.33	0.48	0.485
Neem(5g/kg)	0.36	0.47	0.565
Mint(1g/kg)	0.36	0.39	0.445
Mint(5g/kg)	0.35	0.46	0.480

**Table 4: Effects of Experimental Diets on Feed Conversion Ratio of Broiler Chickens**

	First 10 Days	Second 10 Days	Third 10 Days
Control	2.2536	2.3615	1.5919
Neem(1g/kg)	1.9152	1.9250	2.4515
Neem(5g/kg)	1.7611	1.9723	2.1062
Mint(1g/kg)	1.6361	2.3359	2.6607
Mint(5g/kg)	1.4543	1.9870	2.4708

The experimental birds at the first 10 days after the brooding period, no significant differences were observed between the weight gain of birds receiving the treatment of high (5g/kg) and low (1g/kg) concentrations of both *Mentha piperita* and *Azadirachta indica* leaves with the control diet, therefore the control treatment had the least average weight gain among other treatments. In the second 10 days, significant growth promoting effect was observed from the high concentration of *Azadirachta indica* (5g/kg) than the control group. During the entire rearing period, birds fed with high concentration of neem had better weight gain compared to the control group. Feed Conversion Ratio is the rate at which the bodies of the chicken convert the feed they take into desired outcome, which is meat in this case. The results of this study shows that the feed conversion ratio is greater in the control than other treatments at first and second 10 days after brooding. Meanwhile, the feed conversion ratio of the respective treatments became higher in the respective treatments than the control group. Overall, the result shows significant improvement in feed conversion ratio of birds receiving the treatment of low *Mentha piperita* concentration (1g/kg). In general, there was no mortality in all the groups receiving *Mentha piperita* and *Azadirachta indica* leaves treatment at all the concentrations. Only one mortality was recorded in the control group. This is likely because of the antibacterial, antifungal and antiviral properties of the plants supplemented in the groups with no mortality, it obviously protects the chickens from common diseases.

The performance of birds fed *Azadirachta indica* (Neem) showed significantly better performance as compared to the rest of treatments, because the weight gain is higher in the group fed with 5g/kg of *Azadirachta indica*. These results coincide with those of (Ganguly, 2014) who achieved highest body weight gain and best feed

conversion ratio as compared to control when neem was offered to broilers from 1 to 6 weeks. The result shown in table 2 of this study also indicated that feeding broilers with *Mentha piperita* led to significant improvements in daily weight gain in both the grower and finisher periods. For example, from the average of 0.6340 to 0.5650 in the group receiving 5g/kg of neem. This result was in agreement with the results of Ocak *et al.*, 2008 who reports that feeding broilers with mint promotes the growth of the birds. It seems that the positive effect of different levels of peppermint on increasing average daily weight gain was due to its minimum effects on gastrointestinal disorders, thus strengthening the digestive system and improving feed efficiency (Cross *et al.*, 2002) Moreover, the antiseptic property of peppermint prevents harmful bacterial growth in the digestive system that led to better digestion and absorption (Heidari *et al.*, 2012). These results showed that the use of peppermint throughout the rearing period could decrease broiler mortality. Because from the above results, there is no single mortality in all the groups receiving *Mentha piperita* at both 5g and 1g/kg of feed. Other results also showed that peppermint had a suitable role in decreasing mortality deriving from heart attack in male chicks, it seems the essential oil of the peppermint is effective to set the heart's activity and preventing cardiac complications (Savitri *et al.*, 2002). In this regard, using the oil of peppermint has been reported in heart pharmaceutical formulations such as valocordin and zelenin drops (Savitri *et al.*, 2002) It should be noted that peppermint has antioxidant activity and is able to counteract free radicals and oxidative stress, antioxidants have been shown to combat a wide variety of diseases. Therefore, peppermints, which possess antioxidant activity, have protective effects on chicks and also enhance their quality.

## CONCLUSION

The results of this study shows that the leaves of *Mentha piperita* (Mint) and *Azadirachta indica* (Neem) are non-toxic, therefore safe for consumption. The leaves are further evaluated for growth promotion in broiler chickens. The results reveals that inclusion of these plant materials; Mint and Neem in broiler diets can

serve as growth promoters to the chickens. The ratio of *Azadirachta indica* at the concentration of 5g/kg of feed shows the highest increase in the weight of the broiler chickens. Medicinal plant supplements are used commonly as dietary additives animals and these plants are therefore highly recommended for broiler diets.

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