



Medicinal Plants and their Applications in Poultry Production: A Review

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Abstract

The presence of phytochemicals cannot be separated from medicinal plants; this is because they are active compounds that enable them to perform pharmacological or therapeutic activities in the bodies of animals. These compounds include flavonoids, phenols, tannins, terpenoids, alkaloids, and saponins, which have anti-inflammatory, antioxidant, anti-helminthic, anti-diabetic, anti-cancer, antifungal, antiviral, cytotoxic, and immune-stimulatory properties, among others. Phytochemicals are natural compounds, chemical-free, non-toxic, effective, and eco-friendly. Their concentrations in plants can be influenced by the age of the plant, species, geographical location, processing methods, and parts of the plants used. However, it is incorrect to assume that dietary supplementation of medicinal plants cannot be harmful to animals, especially when administered above the optimum level. Therefore, the essence of this review is to identify some of the medicinal plants that have been used to feed animals and to also identify their optimum levels. This will further help to address the increasing cases of antimicrobial resistance that have become a global threat and will also help to promote poultry production and food safety.

Keywords: Antimicrobial, Antibiotics, Food safety, Poultry, Production, Phytochemicals.

1. Introduction

Banning the use of antibiotics in poultry production is a crucial and urgent public concern because its overuse or misuse have led to the emergence of antimicrobial resistant bacteria (Jan and Ester, 2020; Mojca, 2020b). Therefore, the use of herbal supplements or phytogenics is one of the solutions to promoting animal production, health and even eliminating the need for antibiotics (Daniel et al, 2023; Musa et al., 2020). Phytogenics are plant-derived preparations, including herbs, spices, and fruits, as well as preparations like essential oils or oleoresins, containing highly active secondary plant metabolites with a wide variety of activities that can potentially substitute feed antibiotics (Mojca, 2020a). They can contain thousands of active constituents (phytochemicals) that are non-toxic, chemical residue free, eco-friendly and has no withdrawal period (John, 2024a; Musa et al., 2020). Phytochemicals can be found in the leaves, stem bark, roots, buds, flowers and seeds of herbal plant at various concentrations (Ojediran et al., 2024a). Ojediran et al. (2024b); John (2024b), reported that factors such as age of plants, part of plants used, storage, method of extraction, specie and geographical location could influence the concentrations of phytochemicals in herbal plants.

Phytochemicals such as, flavonoids, tannins, phenols, saponins, terpenoids, alkaloids have been reported to have medicinal and pharmacological importance like, anti-inflammatory, antifungal, antiviral, antioxidant, cytotoxic (Choi et al., 2013; Klavina et al., 2015), immune-modulatory (Adeoye-Isijola et al., 2018), gastro-protective, anti-cancer (Subavathy and Thilaga, 2015), anti-diabetic, anti-diarrhea (Manilal et al., 2011), anti-helminthic, antibacterial, hepato-protective, anti-malarial (Wadood et al., 2013), anti-hypertensive (Aworinde et al., 2016), antimicrobial (Sharma, 2012; Bazie et al., 2014), anti-tumor, neuro-protective (Alagbe et al., 2022), cardio-protective and anti-spasmodic properties (Gawali and Jadhav, 2011). Ethno medically, extracts from herbal plants can be traditionally used in the treatment of weakness, dizziness, pyrexia, nausea, gastro-intestinal disorders, malaria, sores, sexually transmitted infection, diabetes, ulcer, snake bite, blood sugar level, pile, worm, metabolic disorder and internal heat (Shanmugapriya et al., 2012; Karthika and Paulsamy, 2014).

Phytogenic feed additives show a wide range of potential benefits such as, increased enzymatic activity in the intestinal tract, improved nutrient utilization, scavenging the activities of free radicals, inhibiting the activities of pathogenic organisms in the gut, oxidative stress prevention, amongst other all aimed at targeting the enhancement of performance of birds (Shittu et al., 2024). In view of the abundant potential in herbal plants and the need to promote performance, sustainability, welfare and food safety in poultry production, this review is a compendium of different medicinal plant extracts as well as their optimum level from different researchers.

Table 1. Application and optimum levels of some phytochemicals in poultry production.

Medicinal plants	Optimum dietary inclusion level	Specie/effect on birds	References
Grape seed extract	0.01 to 0.02 %	Pekin ducks: growth stimulator, gastro-protective, hypolipidemic properties	Ao and Kim (2000)
Tea extract granule	80 mg/kg	Broilers: Gastro-protective, Immune-stimulator	Chi et al. (2000)
<i>Yucca schidigera</i> extract	180 mg/kg	Broilers: Growth promoter	Chi et al. (2000)
Moringa leaf powder	4 %	Pekin ducks: Gastro-protective	Mazharul et al. (2024)
<i>Daniellia oliveri</i> leaf extract	40 mL per litre of water	Broilers: appetite stimulator, gastro-protective, hepato-protective, antimicrobial properties	Olafadehan et al. (2020)
<i>Piliostigma thonningii</i> leaf extract	80 mL per litre of water	Broilers: growth promotion, hepato-protective, immune-modulator	Alagbe et al. (2020)
<i>Rauvolfia vomitoria</i> root extract	60 mL per litre of water	Broilers: growth promotion, antimicrobial	Alagbe (2021)
Ginger and garlic powder	14g/kg diet	Broilers: growth promotion, gastro-protective	Oleforuh et al. (2014)
<i>Sida acuta</i> leaf extract	30 mL per litre of water	Broilers: immune modulator, gastro-protective, appetite stimulator, growth promoter	Shittu et al. (2021); Oluwafemi et al. (2021)
Snot apple powder	3 % per kg diet	Broilers: prevents oxidative stress	Jimoh et al. (2025)
<i>Balanites aegyptiaca</i> stem bark	20 mL per litre	Broilers: Cardio-protective, Immune stimulator	Musa et al. (2021)
			Musa et al. (2021)
<i>Alchornea cordifolia</i> stem bark	10 mL per litre	Broilers: Gastro-protective and hepato-protective	
<i>Aristolochia indica</i> leaf powder	40 g/kg diet	Broilers: growth promoter	Adewale et al. (2021); Alagbe et al. (2024)
Coconut shell extract	20 mL per litre	Broilers: Immune modulator	John (2024)
Essential oils			
<i>Thymus vulgaris</i> essential oil	180 mg/kg	Broilers: Growth promoter and hepato-protective	Takeli et al. (2010)
<i>Zingiber officinale</i> essential oil	120 mg/kg	Broilers: Gastro-protective	Takeli et al. (2010); Oluwafemi et al. (2021)
<i>Syzygium aromaticum</i> essential oil	120 mg/kg	Broilers: Immune-modulator	Takeli et al. (2010)

<i>Allium sativum</i> oil	0.3 mL per kg diet	Broilers: Growth promoter	Oluwafemi et al. (2021)
<i>Helianthus annus</i> oil	800 mg/kg diet	Broilers: Growth promoter, hepato-protective	Agubosi et al. (2022)
<i>Cymbopogon citratus</i> oil	400 mg/kg	Broilers: Growth promoter	John et al. (2020)
Papaya essential oil	10 mL per kg diet	Broilers: Gastro-protective, Immune modulator	Daniel et al. (2023); John et al. (2024)

2. Conclusion

Medicinal plants has numerous advantages when supplemented in the diet of birds, the presence of phytochemicals makes them alternative to antibiotics. To achieve a sustainable production, promote food safety and prevents the incidence of antimicrobial resistance the use of medicinal plants needs to be seriously explored. Determining their optimal level before usage will increase its efficacy and prevents toxicity incidence in birds.

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