Phytochemical analysis of four herbal seed extract and their use in poultry ration

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Abstract

Hydroalcoholic extract from four herbal seeds namely, thyme (Thymus vulgaris), fennel (Foeniculum vulgare), Cumin (Cuminum cyminum) and fenugreek (Trigonella foenum graecum) were prepared using soxhlet apparatus and concentrated under reduced pressure in a rotary evaporator. The hydroalcoholic extract of above selected seeds were analysed for comparative studies on presence of various phyto-constituents. The qualitative phyto-chemical analysis of above four seed extracts revealed the presence of tannin, phenol, steroids, terpenoids, amino acids, glycosides and cardiac glycosides. Saponins and flavonoids are present in all seed extracts except cumin, while hydrolysable tannins are present only in cumin. Volatile oils are present in thyme and fenugreek seed extract. The above extracts were subjected for the measurement of total phenolic content (TPC) by Folin-Ciocalteu method using gallic acid standard and the results revealed the presence of total phenol content of 0.577mg gallic acid equivalent per gm dry weight of thyme extract, 0.528mg per gm dry weight of cumin extract, 1.563mg per gm dry weight fenugreek extract, 1.463mg per gm dry weight of fennel extract. It can be concluded that these phytobiotics can be used as a feed additive in poultry ration.

Keywords: Seed extracts, phyto-chemical analysis, phenol content.

Introduction

Antimicrobial resistance is one of the major issues in the world today. It not only affects the poultry but also harmful for health of the human beings. A wide range of feed additives including drugs and antibiotics are used in poultry feed to maximize the efficiency of production, quality of product and to control diseases. These additives results in residues in poultry products, which affect the health hazards to human beings due to various reasons. In the European Union, the use of antibiotic growth promoters as feed additives is now restricted. Countries such as Australia and the USA are following the European example by regulating the use of antibiotics in feeds. In recent years, there has been an increased awareness about the potential compounds of plant origin that have effect in the prevention and treatment of poultry diseases. Most of the recent research work is being carried out to search the most safe and economical growth promoter as an alternative for antibiotics. In this study, the qualitative and quantitative phyto-chemical analysis of the four herbal seeds namely cumin, fenugreek and thyme, were carried out to assess the usefulness of their use as poultry feed additives.

Materials and Methods

Phyto-chemical analysis

Analysis of phyto-chemical profile was performed on four herbal seeds namely cumin, fenugreek and thyme, which were procured from the nuts and spices shop located in T-Nagar Chennai. Then
seeds were later shade dried, powdered and stored in airtight containers at room temperature for further analysis. This part of the study was conducted at Veterinary University Training and Research Centre, Thanjavur. Chemicals, reagents and standards of analytical grade were utilized for this study.

**Qualitative phytochemical analysis**

The hydro-alcoholic extract (Charles et al., 1993) of the above selected seeds were analysed comparatively for the presence of various phyto-constituents. Chemical tests were carried out using the hydro-alcoholic extract from seeds or powdered specimens using standard procedures to identify the constituents. Qualitative phyto-chemical analysis of herbal seed powder was done following the methodology of Sofowora (1994), which is for amino acids, cardiac glycosides, flavonoids, glycosides, phenol, saponins, steroids, tannin, terpenoids and volatile oils.

**Quantitative measurement of Total Phenolic Content with Spectrophotometer**

The above extracts were subjected for the measurement of Total Phenolic Content (TPC) by Folin-Ciocalteu method using gallic acid standard which is also known as gallic acid equivalence (GAE) method (Singleton et al., 1999). Gallic acid was used to establish standard curve for total phenolic content.

**Results**

**Qualitative phyto-chemical analysis**

Phyto-chemical composition of hydroalcoholic extract of four herbal seeds namely thyme, fenugreek, fennel and cumin are presented in Table 1. The qualitative phyto-chemical analysis of above four seed extracts revealed the presence of cardiac glycosides, flavonoids, glycosides, phenol, saponins, steroids, tannin and terpenoids, were present in all seed extracts except cumin while hydrolysable tannins were spotted only in cumin. Volatile oils were traced in thyme and fenugreek seed extract.

**Quantitative phytochemical analysis**

Quantitative estimate of total phenol content in hydro-alcoholic extract of four herbal seeds is presented in Table 2. The results showed highest total phenol content in thyme and cumin followed by fenugreek and fennel seeds extract. The gallic acid standard curve with different concentrations is presented in Fig. 1.
Table 1: Qualitative phytochemical analysis of hydroalcoholic extract of four herbal seeds

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Phytochemicals</th>
<th>Cumin</th>
<th>Fennel</th>
<th>Fenugreek</th>
<th>Thyme</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cardiac glycosides</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>2</td>
<td>Flavonoid</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>3</td>
<td>Glycosides</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>Hydrolysable tannins</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Phenol</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>6</td>
<td>Saponin</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>Steroids</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>8</td>
<td>Tannin</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>9</td>
<td>Terpenoids</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>10</td>
<td>Volatile oils</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

*+ indicates presence, - indicates absence*

### Quantitative phyto-chemical analysis

**Cumin** *(Cuminum cyminum)*: The total phenol content of 1.463mg gallic acid equivalent per gm dry weight was reported in hydro alcoholic cumin seed extract. The methanol extract was found to contain different levels such as 9mg/g dry weight (Thippseswamy and Naidu, 2005), 0.23g/100g of dry weight (Shan et al., 2005), 241.41mg/100g dry weight (Souri et al., 2008) while (Chan et al., 2011) concluded 25mg/100g of dry weight in aqueous extract of cumin.

Comparatively low phenol content in all herbal seeds was observed in the present study which could be due to extract to which phenol content was estimated.

**Fennel** *(Foeniculum vulgare)*: The estimated total phenol content of 0.528mg gallic acid equivalent per gm dry weight in fennel extract was indicated in results. But variable higher levels of phenol content in different extracts were seen as by Souri et al. (2008) as 165.07mg GAE/100g dry weight (Souri et al., 2008) while (Chan et al., 2011) concluded 25mg/100g of dry weight in aqueous extract of cumin.

**Fenugreek** *(Trigonella foenum graecum)*: The total phenol content of 0.577mg gallic acid equivalent per gram dry weight hydro alcoholic fenugreek extract was recorded in present study. In contrary Marghitas et al. (2011) spotted the relatively higher total phenolic content of 27mg GAE/g dry weight sample in ethanolic extract of thyme.

**Thyme** *(Thymus vulgaris)*: The quantitative estimate results reported the presence of total phenol content of 1.563mg gallic acid equivalent per gram dry weight of thyme extract. In contrary Marghitas et al. (2011) spotted the relatively higher total phenolic content of 27mg GAE/g dry weight sample in ethanolic extract of thyme.

Table 2: Quantitative content of phenol in hydroalcoholic extract of four herbal seeds

<table>
<thead>
<tr>
<th>Hydroalcoholic extract</th>
<th>Cumin (mg Gallic acid equivalent/g dry wt)</th>
<th>Fennel (mg Gallic acid equivalent/g dry wt)</th>
<th>Fenugreek (mg Gallic acid equivalent/g dry wt)</th>
<th>Thyme (mg Gallic acid equivalent/g dry wt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumin</td>
<td>1.463</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fennel</td>
<td></td>
<td>0.528</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fenugreek</td>
<td></td>
<td></td>
<td>0.577</td>
<td></td>
</tr>
<tr>
<td>Thyme</td>
<td></td>
<td></td>
<td></td>
<td>1.563</td>
</tr>
</tbody>
</table>

### Conclusion

Among the qualitative phyto-chemical tests carried out, most of the important phyto-chemicals presence was noticed in all four herbal seed extracts while flavonoids and saponins were absent in cumin while hydrolysable tannins were spotted only in cumin. However, volatile oils were traced only in fenugreek seed and thyme extracts. The higher phenol content was estimated in thyme followed by cumin seed extract, while lower phenol content was found in fenugreek and fennel seed extracts. Some of these phytobiotics can be used as a feed additive in poultry ration.
Acknowledgement
The researchers would like to thank dean of Madras Veterinary College, Chennai and Head of Veterinary University Training and Research Institute, Thanjavur, for providing the necessary facilities required to carry out experiment and their assistance.

References
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