

# Endogenous recipes for controlling arthropod ectoparasites of domestic poultry

Receitas caseiras para o controle do ectoparasita artrópode nas aves domésticas

Sahidou Salifou<sup>1</sup>; Oyéniran Thierry La Fronde Offoumon<sup>1</sup>; Fadéby Modeste Gouissi<sup>2\*</sup>; Louis-Joseph Pangui<sup>3</sup>

<sup>1</sup>Laboratoire de Recherches en Biologie Appliquée, EPAC/UAC. 01 BP 2009 Cotonou, Benin

<sup>2</sup>Centre Interfacultaire de Formation et de Recherche en Environnement pour le Développement Durable – CIFRED, Université d'Abomey-Calavi – UAC, 03 BP 1463 Jericho Cotonou, Benin

<sup>3</sup>Laboratoire de Parasitologie, Ecole Inter-Etats des Sciences et Médecines Vétérinaires de Dakar, BP 5077 Dakar, Senegal

Received August 27, 2012

Accepted December 10, 2012

## Abstract

This study is a contribution to the inventory of medicinal plants and other methods used in controlling external parasitic diseases of backyard poultry in the localities of Djougou and Ouaké (department of Donga, Benin). It consists of a survey undertaken from December 2010 to March 2011 through visits and interviews with 210 poultry famers. The results indicate that 13 species of medicinal plants are used in controlling ectoparasites. *Annona senegalensis*, *Tectona grandis*, *Securidaca longepedunculata*, *Indigofera hirsuta*, *Lophira lanceolata*, *Hyptis spicigera*, *Steganotaenia araliacea*, *Oxytenanthera abyssinica*, *Nicotiana tabacum*, *Jatropha curcas*, *Ficus exasperata*, *Azadirachta indica* and *Parkia biglobosa* are believed to treat external parasitic diseases in the area of this study. *Annona senegalensis* was the most frequently cited plant (18%,  $p < 0.05$ ) used in remedies against external parasites in poultry. Other traditional recipes such as palm oil and ash have been reported.

**Keywords:** Medicinal plants, poultry, ectoparasites, Donga department, Benin.

## Resumo

Este estudo é uma contribuição ao inventário de plantas curativas e outros métodos endógenos usados no combate aos ectoparasitos de pássaros de currais nas aldeias de Djougou e Ouaké (departamento do Donga, em Benin). A pesquisa foi conduzida entre dezembro de 2010 e março de 2011, durante visitas e entrevistas com 210 criadores de aves. Os resultados indicam que 13 espécies de plantas curativas são utilizadas no combate aos ectoparasitos. *Annona senegalensis*, *Tectona grandis*, *Securidaca longepedunculata*, *Indigofera hirsuta*, *Lophira lanceolata*, *Hyptis spicigera*, *Steganotaenia araliacea*, *Oxytenanthera abyssinica*, *Nicotiana tabacum*, *Jatropha curcas*, *Ficus exasperata*, *Azadirachta indica* e *Parkia biglobosa*, são usadas para tratar uma doença parasitária externa na área de estudo. *Annona senegalensis* foi a planta mais frequentemente usada (18%,  $p < 0.05$ ) como medicação contra os parasitas externos das aves. Outras receitas tradicionais como o óleo de palma e a cinza tem sido comunicadas.

**Palavras-chaves:** Plantas curativas, avícula, ectoparasitas, departamento Donga, Benin.

## Introduction

External parasites are endemic in rural poultry and often have a seasonal pattern. Indeed, traditional poultry farms are especially affected by ectoparasites like lice, fleas and ticks during wet periods of the year. The prevalence is higher during the rainy season. Lice invade the nests of laying hens during the laying period and after hatching; they also invade the owner's houses and, in some cases, affect the whole compound and take on the appearance of a minor

zoonosis. Arthropod ectoparasites are commonly responsible for stunting, reduced egg production, weak vitality, damage to feathers and even death (GUEYE, 1997; RUSHTON et al., 1998).

For health monitoring, farmers normally rely on government extension services. They often need veterinary products, but veterinary pharmaceuticals are in short supply in West Africa. In their attempt to overcome the unavailability of veterinary drugs, farmers use the available endogenous knowledge and resources, which are mainly based on medicinal plants. Thus, it seems possible to effectively control many diseases without resorting to expensive veterinary treatment. Indeed, apart from during exceptional periods of drought, traditional medicine uses a number of plants with

\*Corresponding author: Fadéby Modeste Gouissi  
 Centre Interfacultaire de Formation et de Recherche en Environnement pour le Développement Durable – CIFRED, Université d'Abomey-Calavi – UAC,  
 03 BP 1463 Jericho Cotonou, Benin  
 e-mail: gouissi@yahoo.fr

recognized medicinal properties (FANOUE, 2006). These plants are available either on site for free or are readily available at low cost.

This study provides an inventory of the arthropod ectoparasites of backyard poultry and the endogenous control methods commonly used by farmers.

## Materials and Methods

### 1. Study location

The department of Donga is located in the northern part of West Benin, and covers an area of 11126 km<sup>2</sup>. This department includes four municipalities: Bassila, Copargo, Djougou and Ouaké. The present study covered the period from December 2011 to March 2012 and involved two of these municipalities: Djougou and Ouaké. Data were collected through a survey in which a series of questionnaires was applied to farmers.

### 2. Survey

The survey was conducted between December 2010 and March 2011. An interview guideline including questions based on the management of diseases in poultry was used to assess the endogenous antiparasitic methods practiced. Plants mentioned in the recipes were stored and harvested for subsequent botanical description. Cited or harvested plants were then identified in the laboratory of the National Herbarium of the Faculty of Science and Technology (FAST), University of Abomey-Calavi (UAC).

### 3. Statistical analysis

Significant tests were carried out using analysis of variance (ANOVA) in the Statistical Package for the Social Sciences 16 (SPSS 16) computer software. Means were separated using the Duncan Multiple Range Test.

## Results

### 1. Endogenous recipes collected and zonal distribution

Figure 1 shows the various endogenous control methods per municipality. By comparing the methods found in the two municipalities, we found that:

- Four plants (*Hyptis spicigera*, *Securidaca longepedunculata*, *Nicotiana tabacum* and *Azadirachta indica*) are used in Ouaké but are not known in Djougou;
- Two plants (*Ficus exasperata* and *Steganotaenia araliacea*) are used in Djougou but are not known in Ouaké; and
- Regarding the types of treatments commonly used in the two localities, many farmers in Djougou simply keep their henhouses clean. Farmers also tend to use more kerosene, ash (wood ash from their kitchens) and oil (palm oil and shea butter). Regarding common plants used in the two localities, this is done with higher frequency in Djougou than in Ouaké, except for *Annona senegalensis*.

### 2. List of plants used directly in endogenous methods

Figure 2 shows that five plants have higher frequency and therefore represent the most commonly used plants against ectoparasites. These are *Annona senegalensis* (19%), *Tectona grandis* (15%), *Securidaca longepedunculata* (13%), *Indigofera hirsuta* (12%) and *Lophira lanceolata* (12%). The variety of recipes reflects the variety of knowledge among the animal owners and possibly the uncertainties regarding the effectiveness of these plants.

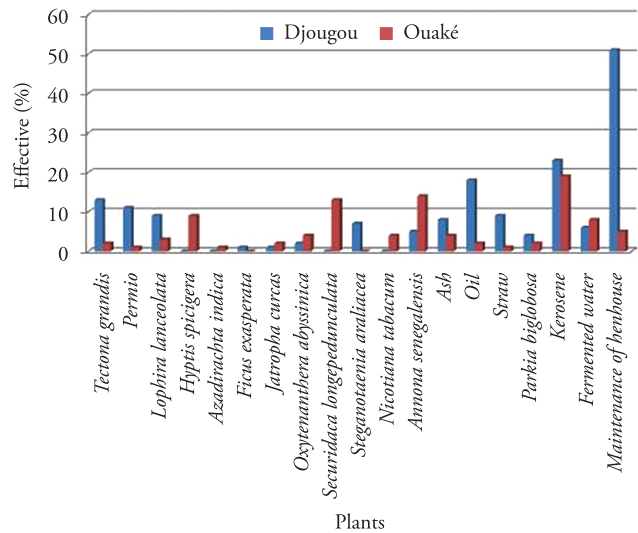


Figure 1. Distribution of the endogenous collection methods in the municipalities of Djougou and Ouaké.

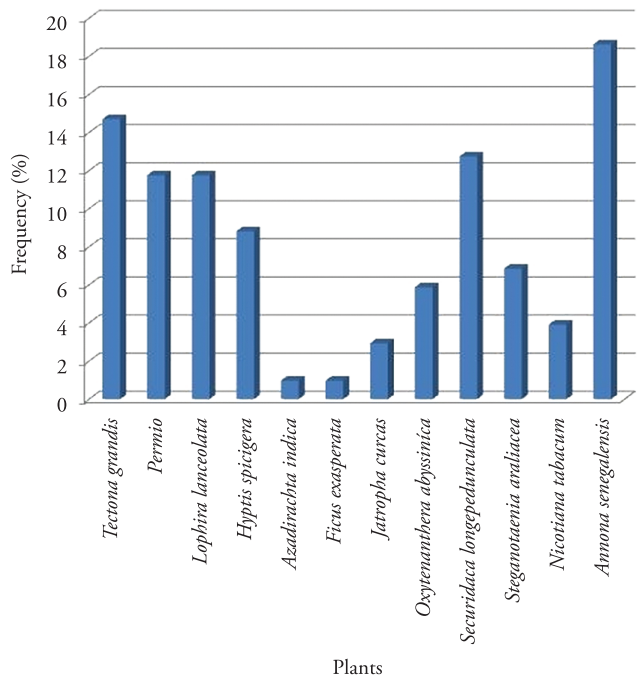


Figure 2. Frequency of distribution (%) of the plants used in veterinary care.

### 3. Other known forms of endogenous treatment used by the farmers against ectoparasites

Figure 3 highlights that four other endogenous forms of treatment are used by farmers. The main ones are ash, oil, straw burning and juice from fermented extracts of *Parkia biglobosa* (nééré) pods in water. Ash is collected directly from the kitchen, while various oils (palm oil and shea butter) are common ingredients locally used for cooking. In some case, the henhouse is scorched by burning straw or *Parkia biglobosa* pods or hay. *Parkia biglobosa* pods are also soaked in water for 72 hours, which produces a fermented solution that farmers use to spray their henhouses.

### 4. Utilization rate of veterinary inputs

This study revealed that very few farmers use veterinary inputs (Figure 4); among these, the main drugs used are Crésyl, sulfamide 33, Ita-new® and oxytetracycline. The majority of farmers do not use veterinary inputs. The causes of this situation can be explained by:

- Veterinary inputs not made available to farmers;
- Unavailability of veterinary inputs among farmers; and
- Ignorance among farmers regarding the existence of veterinary inputs and their effectiveness.

### 5. Identification of medicinal plants used in endogenous methods against ectoparasites

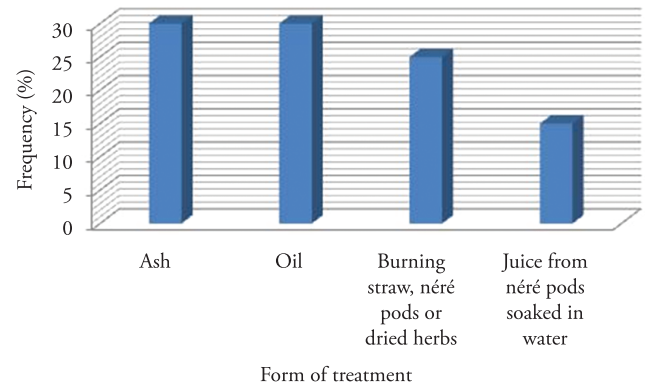
The survey conducted in the municipalities of Djougou and Ouaké gathered information on eighteen endogenous control methods against ectoparasites, including three methods without using plants, thirteen methods using medicinal plants directly and two methods using parts of plants after processing.

### 6. Use of various liquids and ash

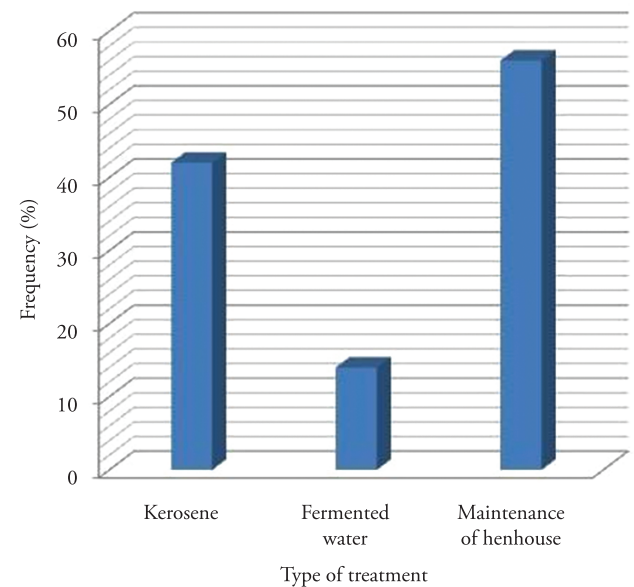
- Many owners resort to regular cleaning of their henhouses as a measure to reduce ectoparasite pressure on their birds;
- Kerosene sprays: Kerosene is a hydrocarbon sprayed in henhouses, against ectoparasites. It is also used against the insects that adhere to the skin especially on the head of the birds. In such cases, the owners apply a light tampon on parasites; and
- Broth from fermented cereals like maize, sorghum or millet is also used to spray henhouses or to bathe birds that have been attacked by fleas and lice.

### 7. Use of medicinal plants after processing

- The ash from firewood used in kitchens allows chickens to get rid of external parasites from the dust baths that they have. Chickens are also sometimes sprinkled with ashes by farmers; and
- Shea butter or palm oil is rubbed on the parts of the legs of birds that are especially attacked by scabies. A layer of shea butter or palm oil helps to control scabies. The application is made two to three times per week for one to two weeks.



**Figure 3.** Frequency distribution (%) of other forms of known endogenous treatment by farmers.



**Figure 4.** Frequency distribution (%) of types of treatment without plants.

### 8. Use of medicinal plants

The majority of medicinal plants generally control fleas and lice. Generally, farmers use certain parts of the plant, such as the leaves, roots and fruit pods, or the whole plant.

- *Oxytenanthera abyssinica*, Poaceae (sundouou or bambo in the Lokpa local language):

Fresh leaves infused in water for four days. The fermented infusion containing leaves is used to spray the henhouse.

- *Jatropha curcas*, Euphorbiaceae (atabalao in the Lokpa local language):

Leaves of this plant are triturated in water, and then the mixture is sprayed on the interior walls and floor of the henhouse. The leaves can also be left loose inside the henhouse or can be hung on its walls

- *Azadirachta indica* Meliaceae (neem or kini in the Lokpa local language):

The leaves are triturated in water and this water is used to spray inside the henhouse.

- *Lophira lanceolata*, Ochnaceae (mama kooɔu in the Yom local language):

Fresh leaves are spread in the henhouse and are left until they dry. This is repeated two to three times a week.

- *Parkia biglobosa*, Mimosaceae (nééré in French):

The pod envelopes are mixed with water, which is then sprayed inside the henhouse.

The smoke from combustion of the pod envelopes of this plant in the henhouse is also said to kill all henhouse ectoparasites.

- *Hyptis spicigera*, Lamiaceae:

Leaves are hung on the walls of the henhouse. Farmers also make an infusion of pounded leaves of this herb soaked in water for 6 to 12 hours, which is then sprayed in the henhouse.

- *Steganotaenia araliacea*, Apiaceae (kpimbool in the Yom local language):

Fresh leaves are strewn in the henhouse and then are left until they dry. This is repeated once or twice a week.

- *Ficus exasperata* Moraceae (wawasargo in the Yom local language):

Branches with fresh leaves are strewn in the henhouse and then left until they dry. This is repeated once a week.

- *Annona senegalensis*, Annonaceae (waloho in Yom or doukouhi in the Fulani local language):

Fresh leaves are spread in the henhouse and left until they dry. This is repeated once or twice a week.

- *Tectona grandis* Verbenaceae:

Leaves of this plant are thrown in the henhouse and left until they dry.

- *Indigofera hirsuta* Fabaceae (PÈémior in the Yom local language):

Fresh leaves of the plant or the whole plant are strewn in the henhouse and left until the leaves of the plant are dry. This is repeated once a week.

- *Securidaca longepedunculata*, Polygalaceae (Psaha in the Lokpa local language):

Fresh or dried cortex of the roots of the plant is pounded and mixed with water; the mixture is sprayed in the henhouse.

- *Nicotiana tabacum*, Solanaceae:

Dried leaves of *Nicotiana tabacum* are ground up and the powder is sprayed in the henhouse, mainly to control lice.

## Discussion

Promotion of bird-rearing in the backyard can be seen as a development strategy in the study area and could play an important role in controlling poverty (SALIFOU et al., 2007). However, this activity is affected by ectoparasitism. The inventory of endogenous control methods presented here revealed 13 species of medicinal plants that are used in controlling ectoparasites.

Ash is used both in henhouses and directly on the birds' bodies. It is used as a disinfectant for henhouses and as protection for birds without parasites. Slightly warm ash sprinkled in

henhouses leads to reduction of the number of henhouse ectoparasites of, or prevents ectoparasites if the henhouse was not infested. The ash baths that birds have, or ash sprinkled onto the birds' bodies by the farmers, helps the birds to get rid of ectoparasites or protect against ectoparasites. This method is also practiced in Nigeria, but in that country, ash from the burning of *Nicotiana rustica* leaves, *N. tabacum* or *Carica papaya* is used. This is rubbed into the plumage to protect against infestation (DALZIEL, 1937; NWUDE; IBRAHIM, 1980). In Burkina Faso, Bessin et al. (1998) reported that wood ash is used against external parasites. Birds are sometimes provided with boxes containing sand and ashes, which the birds use for dust baths, thereby keeping their plumage clean and free of infection.

Shea butter is used as a curative method against bird scabies. This method was used by Van Eekeren et al. (2006) to treat scaled legs (crusted due to mites), by soaking them in kerosene or rubbing them with grease, oil or shea butter. In Burkina Faso, Tamboura et al. (1998) used the method of brushing hens with oil or shea butter, which would obstruct the respiratory system of lice or ticks, thereby controlling these parasites. Other authors in Burkina Faso, like Bessin et al. (1998), reported that shea butter is used against external parasites.

Palm oil is used especially against fleas and mites. The flea species is *Echidnophaga gallinacea*. The mites are found on the birds' heads and skin: these are red mites of the species *Dermanyssus gallinae*, belonging to the class Arachnida and family Dermanyssidae. In Benin and in Togo used palm oil to control ectoparasites by means of a coat of oil painted onto the infected birds. In Ghana, palm oil (red oil) is used to rub on the scaly legs of affected birds, in order to control mites.

Some of the plants revealed in this study at the localities of Djougou and Ouaké have been used by other authors. *Nicotiana tabacum* was used as a preventive measure by Van Eekeren et al. (2006), by placing tobacco leaves or tobacco leaves mixed with ash in the nests, thereby keeping the insects away. Tobacco leaves (*Nicotiana tabacum*) provide protection for approximately one month against *Sarcoptes*, *Psoroptes* and *Demodex*. Uly (1993) demonstrated that neem (*Azadirachta indica*) products were effective against *Dermanyssus gallinae*. Good daily cleaning of the henhouse is very important and is a golden rule for keeping diseases away; it is also the basis for controlling ectoparasites (VAN EEKEREN et al., 2004). Good hygiene methods can be added to burning of straws in henhouses, as used in Nigeria (NWUDE; IBRAHIM, 1980) to reduce the ectoparasite rates in henhouses. However, the latter authors used plants like specific dried leaves and twigs of *Senegalensis Lam Guiera*, which are consumed by poultry.

## Acknowledgements

We thank the farmers for their participation in the study. We also thank the agents of animal health services of Communal Agricultural Promotion. We are grateful to the team at the Applied Biological Research Laboratory.

## References

- Bessin R, Belem AMG, Bouessini H, Compaore Z, Kaboret Y. Enquête sur les causes des mortalité des pintadeaux au Burkina Faso. *Rev Elev Méd Vét Pays Trop* 1998; 51(1): 87-93.
- Dalziel JM. *The useful plants of West Tropical Africa*. London: Crown Agents; 1937. 612 p.
- Fanou U. *Première évaluation de la structure et de l'importance du secteur avicole commercial et familial en Afrique de l'Ouest*. FAO, ECTAD/AGAP; 2006.
- Gueye EHF. Diseases in village chickens, control through ethno-veterinary medicine. *ILEIA Newsletter* 1997; 13(2): 20-21.
- Nwude N, Ibrahim MA. Plants used in traditional veterinary medical practice in Nigeria. *J Vet Pharmacol Ther* 1980; 3(4): 261-273. <http://dx.doi.org/10.1111/j.1365-2885.1980.tb00491.x>
- Rushton J, Ngongi SN. Volailles, femmes et développement: idées anciennes, nouvelles applications et nécessité de recherches supplémentaires. *World Anim Rev* 1998; 91: 43-48.
- Salifou S, Lafia KB, Emmanuel-Ali N, Offoumon T, Pangui LJ. Acariens et insectes parasites des oiseaux de la basse-cour dans le Nord-Ouest du Bénin et effets insecticide des huiles essentielles *Lantana camara* (Lamiolles, Verbanaceae). *Rev Afr Santé Prod Anim* 2007; 5(1-2).
- Tamboura H, Kabore H, Yameogo SM. Ethnoveterinary medicine and indigenous pharmacopeia in central region of Burkina Faso: case of Passore province. *BASE* 1998; 2(3): 181-191.
- Uly M. *Médecine Vétérinaire naturelle: lutte contre les ectoparasites tropicaux*, V. J. Margraf, édit. Weikersheim: Scientific book; 1993. 185 p.
- Van Eekeren N, Maas A, Saatkamp HW, Verschuur M. *L'aviiculture à petite échelle dans les zones tropicales*. 4th ed. rev. Wageningen: Fondation Agromisa et CTA; 2004. 83 p.
- Van Eekeren N, Maas A, Saatkamp HW, Verschuur M. *L'élevage des poules à petite échelle*. 4th ed. rev.; Wageningen: Fondation Agromisa et CTA; 2006. 97p.