

MADRE DE CACAO (GLIRICIDIA SEPIUM) AND SINTA (ANDROGRAPHIS PANICULATA) LEAVES EXTRACT AS BOTANICAL ANIMAL LICE AND TICKS REMOVER

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ABSTRACT

- The use of chemical to control lice and ticks of animals especially on dogs is a usual thing to individuals as this abound in many agrivet store in the market. The unusual way is that many don't know that this chemically compounded formula is harmful to animal, environment and to human beings as well.
- This study was conducted to help the dog owner control the rapid increase of parasite population that becomes a menace not only to pests but also to humans since dogs are considered part of the household. The formula, as lice and ticks remover is botanical, organic and the effect is not hazardous to animals.
- This research used the experimental and descriptive method in order to observe and ensure that the field trials measure accurately the effectivity as botanical control. Among the three preparations used in the three trials, it was found out that the 2:2:2 made up of 2 cups of madre de cacao extract, 2 cups of sinta extract and two cups of coco milk that are cooked to become oil is more effective that the other formula.

Keywords: Gliricida Sepium, Andrograohis paniculata, Botanical lice, Ticks control, SDS

INTRODUCTION

Animal lovers nowadays had encountered problems regarding uninvited guests that stay on their pets such as those pesky parasites making them miserable.

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Lice sucks the blood of the host, therefore, can cause anemia. Many animals become allergic to the salive injected into their bloodstreams when lice bite them (Mickey Zeldes, 2012). Lice and ticks are common parasites insect in large and small animals. These parasites are very hard to eliminate because they can also live in any part of the animal house or cages if these are not properly disinfected. Since they are miniature, they can hide easily. There are many chemical formulations sold in the market: injectable, powder form, shampoo and soap. There are products which have lasting effect but are expensive. On the other hand, there are those which are affordable but are less effective since dogs are hairy and can be easily affected with these parasites which cause their body to smell bad.

Because of this problem, the researcher come up with this study using Madre de Cacao leaves and Sinta leaves as the main raw materials in eliminating these parasites.

OBJECTIVES OF THE STUDY

The purpose of the study is to determine the effects of Madre de Cacao and sinta leaves extract mixed with coco milk as botanical lice and ticks remover. To clarify further the main problem, the study sought to find the answers to the following:

- Determine the formulation that are effective as lice and ticks remover.
- Determine which of the formulation has shorter duration of time in removing lice and ticks.
- Evaluate the hazardous effect of the formula to the animals.

METHODS AND PROCEDURE

This research uses the experimental and descriptive methods in gathering the data. Field trial was administered to ensure the effectivity of the different preparation in the three trials.

T1 – with 100% madre de cacao leaves extract added	with 50% coco milk.
T2 – with 100% Sinta leaves extract added with 50%	coco milk
T3 – with 100% madre de cacao leaves extract added	with 100& sinta leaves extract
added with 50%	coco milk

Raw materials

- Madre de cacao leaves
- Sinta leaves

- Mature coconut fruit

Formulation of the preparation

- 1 kilo madre de cacao leaves
- 1 kilo sinta leaves
- 2 pieces of matured coconut fruit
- Extract all leaves of madre de cacao and sinta
- Extract the milk of the grated coconut

Procedure of preparation

- Extract juice and madre de cacao added with coco milk, place in the sauce pan, cook in low fire, stir slow until the extract turned into oil.
- Do the same procedure with sinta
- Mix madre de cacao extract, sinta extract, coco milk and place in a sauce pan. Place it in low fire until the mixture turned into oil.
- Spray the formulation in the affected animal.

RELATED STUDIES

Based on the information gathered by the researcher from the old folks in remote barangay of Cantilan, they used Madre de Cacao as feeds to large animals and is also used as medicine to prevent the spread of scabies.

Studies conducted by Booth and McDonald (1982) stated that another active constituent found in madre de cacao or *kakawate* leaf is fats. Fats are needed in dermatology as protective agents to prevent contact with irritating substance and lubricating agents which aid in the removal of crusts and to prevent excessive dryness and vehicles for the incorporation of drugs in the treatment of skin diseases.

Musser and O'neil (1969) Kirk (1979) found out that fats make for intimate and prolonged contact with skin. Aside from the active chemical content in the *kakawate* leaves, it is also reported that its leaves possess a feted smell. When crushed, it is applied externally in order to get rid of fleas and ticks of cattle. A study done by Alfredo Rabena, a full professor of the University of Northern Philippines in Vigan City found out that madre de cacao leaves are good source of coumarins, a toxic substance that can kill almost all types of pest and insect.

He further stated that one kilogram of madre de cacao leaves soaked in water overnight can produce seven galloon of botane pesticides (botanical pesticides)

Rabena and Malaysian Chemist Dr. Nordin Lajic (1996) at the University of the Philippines in Los Banos Laguna, in their three-year study found botano pesticides as effective pest control. This technology is being used by rice and vegetable farmers. Rabena said he wanted to provide Filipino farmers an alternative aside from commercial pesticides to lessen the cost of production.

Another researcher conducted a study to test the possibility of madre de cacao extract as cure to skin problem. It aimed to make an alternative medicine out of this herbal plant in a form of ointment which is economical and effective in the treatment for skin diseases.

Sinta as King Bitter also called andrographics is a traditional Chinese herb. Southeast Asia and Indian herb are used for centuries as agunvedic medicine. The herb has been revered for treating infectious diseases and highly regarded as having a preventive effect from any diseases, due to its powerful immune strengthening benefits. The global flu epidemic of 1919 was one of the most devastating infectious outbreak in world history, killing millions worldwide in many countries. However, in India, the amazing prophylactic benefits of andrographics was credited in stopping the deadly virus. It is a potent stimulator of the immune system by two direct ways: as antigen-specific response antibodies made to counterpart invading microbes and nonspecific immune response, macrophage cells scavenger and destroy invaders. King of Bitter activates both responses, making it effective against variety of infections and oncogenic, cancer-causing agents.

Uses of Madre de Cacao

Botany

Kakawati is a smooth, deciduous tree, 3 to 10 meters high. Leaves are 15 to 25 centimeters long with 13 leaflets which are opposite, oblong-ovate, 4 to 6 centimeters long, with a pointed tip and rounded base. Racemes are numerous on leafless branches, containing many flowers. Flowers are pink, 2 centimeters long with a truncate calyx. The standard is reflexed and pale yellow in the median part. The pods are narrowly oblong to oblanceolate, 10 to 14 centimeters long, about 2 centimeters wide, containing 6 to 8 seeds.

Folkloric

- For cure of mange, a continuous skin disease of animals caused by several species of mites.

- Effective in treating external parasites
- Bark and leaves are used to treat human skin diseases

Properties

- Tannins are considered potentially antidiarrheal, antidysenteric, antimutagenic, antioxidant, bactericidal, hepatoprotective, pesticidal and viricidal.
- Studies have suggested antimicrobial, anti-scabies, nematicidal, insecticidal, antiviral, acaricidal properties.

Studies

- Anti-Pseudomonas: Crude extract of *Gliricidium sepium* showed potential antipseudomonas drug potential with an in vitro study showing a minimum inhibitory concentration at 1%. (1)
- Anti-Scabies: The study concluded that the "kakawati" preparation is as effective as sulfur lotion in the treatment of scabies. (2)
- Antimicrobial: Study of 10 medicinal plants in Colombian folk medicine, including *G sepium*, was done screening for antimicrobial activity. The ethanol extracts were all active against *S aureus* except for *J secunda*. (4)
- Antimicrobial: A possible alternative in the treatment of non-nosocomial infections: *G. sepium* was one of ten medicinal plants screened for antimicrobial activity, all of which were found effective against three or more pathogenic microorganisms, corroborating their use in folkloric medicine.
- Saponins: Study yielded three new hederagenin-based acetylated saponins from the fruits of *Gliricidia sepium*. (6)
- Insecticidal / Nematicidal / Antibacterial: Study showed nematicidal activity against *Meloidogyne incognita* nematode with 60% mortality; mosquito repellent activity against *Aedes aegypti* with maximum 78% repellency; and antibacterial activity against *E. coli*, *S aureus*, *Pseudomonas spp*, *S typhi* and *Klebsiella spp* with best results against *E Coli*. (7)
- Antimicrobial / Bark: Study on the antimicrobial activity on the bark of five tree species showed *G sepium* to have antimicrobial effects against *S epidermis*, *S aureus*, *P aeruginosa*, *B pumillus* and *V cholerae*. (8)
- Anti-Scabies: In a study of scabies treatment among selected residents of Titay, Zamboanga, results showed a significant difference between pre-treatment and post-treatment scores after one week. However, there was a noted increase of scabies lesions 2 and 4 weeks after. (10)

- Antibacterial / Antifungal: Study investigated an ethanolic extract of *Gliricidia sepium* for antimicrobial activity against gram-positive, gram-negative bacteria, and fungi. Maximum inhibitory activity was between 0.5 and 1 mg ml⁻¹ against bacteria and 2.5 mg ml⁻¹ against fungi (*Fusarium solni*, *Rhizomucor pusillus*, *Trichophyton sclerosis*, *Macrophomnia phaseolina* and *Rhizoctonia solani*). (12)
- Antibacterial / Bark, Flower and Leaf: Study investigated various extracts of bark, flower, and leaf for antibacterial activities against various pathogenic bacteria. Results showed various extracts of flower, bark, and leaves can be used as potential external antiseptic and incorporated into drug formulations. (13)
- Dry Season Feed for Goat Production: Study evaluated the nutritional value of dried *G. sepium* leaves both fed alone and supplemented with cassava peel in West African dwarf goats. Leaves contained 3.3%N and are available throughout the year. Dried leaves stored throughout the dry season showed no deterioration and can serve as feed reserve. (15)
- Acaricidal / Spider mite / *Tetranychus cinnabarinus* (Boisduval): The carmine spider mite is an important pest of various economically important crops. Ethanolic extracts showed acaricidal effects and show promise in the management of *T. cinnabarinus*. (16)
- Antibacterial / Volatile Oil / Bark: The antibacterial activity of essential oil from bark of *G. sepium* checked against various pathogenic bacteria showed pronounced activity against all tested microorganisms (*B. cereus*, *E. faecalis*, *S. paratyphi*, *S. aureus*, *E. coli*, *S. faecalis*, *P. vulgaris*, *K. pneumonia*, *P. aeruginosa* and *S. marcescens*). Results suggest a potential use as an external antiseptic. (see constituents above) (17)
- Antioxidant: Study evaluated the antioxidant property of *Gliricidia sepium* by DPPH radical scavenging assay, NO scavenging assay, super oxide radical scavenging assay and ferrous chelation assay. The plant yielded considerable amount of saponin, phenol, alkaloids, and flavonoids and showed free radical scavenging reducing power and natural chelating property. (19)
- Larvicidal / Mosquito / Leaves: Study evaluated the effectiveness of Madre de Cacao leaf extract as a larvicide for household mosquitoes (*Culex pipiens*). Results suggest the leaf extract has potential as a natural mosquito larvicide and an alternative substitute to commercial mosquito pesticide. (20)
- Rodenticidal Mechanism / Coumarins / Leaves: A study reported in 1966 evaluated the mechanism by which *G. sepium* exerts its rodenticidal properties. Leaf extraction yielded the presence of coumarin as a constituent of the phenolic fraction. Study suggests the bacterial conversion of coumarin into the hemorrhagic agent dicoumerol, and the pathologic evidence

in rats fed on incubated leaves point to coumarin as the basis for rodenticidal property of the plant. (21)

Uses of Sinta

Botany

Sinta is an annual herb, erect, growing to a height of 30 to 100 centimeters. Stems are quadrangular. Leaves are simple, opposite, lanceolate to ovate-lanceolate, glabrous. Flowers are white, bilabiate, with rose-purple spots or markings in the lower lip in axillary or terminal racemes or panicles. Fruit is a capsule, linear-oblong, up to 2 centimeters long and 4 millimeters wide, furrowed, compressed longitudinally with small seeds.

Folkloric

- Used for fever and liver ailments
- Used for diarrhea
- Abortifacient
- Extensively used in Ayurvedic medicine formulation to treat liver disorders.
- Indian Echinacea for its use in the prevention and treatment of the common colds.
- Used to prevent and treatment of common colds.
- Treatment of sore throat, flu, upper respiratory tract infection

Properties

- Extremely bitter and cooling.
- Antidiarrheal, antipyretic, anti-infective, anti-inflammatory, antibacterial.
- Stomachic, febrifuge.
- Antityphoid, antifungal, antimalarial, antihepatotoxic.
- Anti-cancer.
- Tonic and immune-boosting.

Studies

- Comparative Study in Uncomplicated Common Colds : Study comparing Kan Jang, a fixed herbal combination with *Andrographis paniculata* with Immunal containing *E purpurea* found adjuvant treatment with Kan Jang more effective in parameters of nasal congestion and secretion. (2)

- Anti-Malarial : Study of extracts of *A paniculata* and *Hedyotis corymbosa*, known hepatoprotective and fever-reducing was tested for antimalarial activity. Results suggested further studies for a potential herbal drug for malaria treatment.
- Anti-Malarial / Combination with Curcumin: CoMethanolic extracts of *A paniculata* and *H corymbosa* showed inhibition of the ring stage of the parasite without in vivo toxicity, whether used in isolation or in combination with curcumin. (13)
- Antioxidant / Anticarcinogenic: Study showed antioxidant action of the aqueous extract of AP which may play a role in the anticarcinogenic activity by reducing oxidative stress. Lactic dehydrogenase (LDH), as tumor marker, showed decreased activity. Extract effect on more effective than anticancer drug, doxorubicin (DOX).
- Anti-inflammatory: (1) Study showed andrograpanin, one of its components, enhanced chemokine SDF-1 alpha- induced leukocytes chemotaxis. (2) Study isolated active compounds showing anti-inflammatory activity, significantly decreasing TNF- α , IL-6, macrophage inflammatory protein-2 and nitric oxide secretions. Study provides encouraging results for bioactive compound development.
- Diabetes: Study of commercially prepared spray-dried ethanolic extract of AP on STZ-induced diabetic female rats showed increased survival rate and endocrine cell density, improved estrus cycle and reduced "insulin resistance" phenomenon. (6)
- Antivenom activity / *Echis carinatus*: Study was done on the antivenom activity of *A paniculata* and *Aristolochia indica* plant extracts against *Echis carinatus* venom. Results showed both plant extracts could be used for therapy in patients with snakebite envenomation. (7)
- Antivenom activity: Study for antivenom activity against *Daboia russelli* venom confirmed *A paniculata* and *A indica* to possess potent snake venom neutralizing capacity.
- Anti-Hyperglycemic / Renal Protective: Study showed significant antidiabetic activity with extract of AP roots supporting its traditional Ayurveda use for diabetes. Study also showed preventive effect for diabetic nephropathy. (8)
- Spermatogenesis and Semen Quality Study: Study compared Kan Jang, a fixed combo of *Andrographis paniculata* extract (SHA-10) and *Acanthopanax senticosus*, with *Valeriana officinalis* and *Panax ginseng* for spermatogenesis and semen effect. Results showed all three to be safe with respect to effects on human male sterility. (9)
- Andrographolide / Antinociceptive / Antiedematogenic: Study isolated andrographolide from the leaves of *A paniculata*. Results showed andrographolide has antinociceptive and antiedematogenic activities, probably modulated via nonopioid mechanisms. (11)

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- Respiratory Tract Infection Therapy: Review of data suggest that *A paniculata* is superior to placebo and may be a promising treatment for the subjective symptoms of acute upper respiratory tract infection. With few reports of adverse events with short-term use, *A paniculata* presents as an herbal treatment option. (12)
 - Anti-Fertility Effect: Results of study of water extract of *A paniculata* suggest that due to lower level of hormone, female rats have promising percentage of infertility with AP. (14)
 - Renoprotective Effect: Study of aqueous extract of whole plant of *A paniculata* exhibits a significant renoprotective effect in gentamicin-induced nephrotoxicity in male Wistar albino rats. (16)
 - Anti-Dengue: Study of evaluated the antiviral effects of six plants on dengue virus serotype 1 (DENV-1). Results showed the methanol extracts of *A. paniculata* and *M. charantia* possess the ability of inhibiting the activity of DENV-1 in in vitro studies. (17)
 - Cardiovascular Effect / Coronary Vasodilation: Study evaluated a dichlormethane (DCM) extract of *Andrographis paniculata* for cardiovascular activity. Aerial parts yielded five labdane diterpenes. The extract significantly reduced coronary perfusion pressure and reduced heart rate. (18)
 - Gastroprotective / Antiulcer / Cytoprotective: Study of an aqueous and ethanol extract of *A. paniculata* showed significant anti-ulcer and cytoprotective properties and inhibited leukocyte infiltration of the gastric wall. (19)
 - Larvicidal / Repellent / Mosquitoes: Study evaluated the effects of *A. paniculata* and *A. lineata* extracts against two mosquitoes *Cule quinquefasciatus* and *Aedes aegypti*. Results showed that insecticidal activity of plant combinations was ecofriendly and has better larvicidal activity compared to individual extracts. (23)
 - Terpenoid / Inhibitory Activity against Biofouling Bacteria: Phytochemical analysis isolated a terpenoid with inhibitory activity against biofouling bacteria, viz., *Pseudomonas* sp., *Bacillus* sp., *Staphylococcus* sp., and *Serratia* sp. Of various solvents tested, a methanol extract showed the best activity. (24)
 - Andrographolide / Anti-Inflammatory: Andrographolide exhibits anti-inflammatory and anticancer activities, either in vitro or in vivo experimental models of inflammation and cancer. Several immunomodulatory responses of andrographolide have been observed in in vitro studies, such as reduction of iNOS, COX-2, NO, PGE₂, TNF- α and IL-12 in macrophages and microglia. (25)

FINDINGS

Analysis of variance (Two-factor ANOVA) of Madre de Cacao, sinta extract and coco milk as botanical animal lice and ticks remover was given on this part.

Based on the results of the experiment, among the three preparations, the one that has total effect to parasite in the dog's body is the combination formula of madre de cacao, sinta extract, and coco milk that are prepared into oil form is more effective. The ratio is 2:2:2.

Note: Dogs that are subject to experiment must be placed in a cage.

RESULT OF THE EXPERIMENT

Dog1 subjected to experiment.

Table 1 (formulation 1) 2 cups of Madre de cacao and 1 cup of coco milk prepared in oil form sprayed in the body of dog which was affected with lice and ticks

Table 1. Experiment 1

Number of days	Immediate effect	No. of lice fall off dead	No. of ticks fall off dead
Day 1			
Day 2			
Day 3		2	
Day 4		6	2
Day 5		10	2
Day 6		10	6
Day 7			

Dog2 subjected to experiment.

Table 2 (formulation 2) 2 cups sinta leaves extract and 1 cup of coco milk prepared into oil form

Table 2. Experiment 2

Number of days	Immediate effect	No. of lice fall off dead	No. of ticks fall off dead
Day 1			
Day 2		3 fall off still alive	
Day 3		3 fall off still alive	
Day 4		6 fall off still alive	
Day 5		6 fall off still alive	
Day 6		10 fall off still alive	2 fall off still alive
Day 7		12 fall off still alive	5 fall off still alive

Table 2 shows that 3 lice fall off and still alive same on the 2nd and 3rd day; on the 4th and 5th day, 6 lice fall off and alive; on the 6th day 10 lice fall off and alive and 2 ticks fall off and alive; on the 7th day, 12 lice fall off and still alive and 5 ticks fall off and still alive.

Dog3 subjected to experiment.

Table 3 (formulation 3) 2 cups madre de cacao leaves extract plus sinta leaves extract plus coco milk prepared into oil form.

Table 3. Experiment 3

Number of days	Immediate effect	No. of lice fall off dead	No. of ticks fall off dead
Day 1			
Day 2		60	35
Day 3		130	142
Day 4		156	158
Day 5		45	56
Day 6		10	15
Day 7		0	1

The table shows that after the formula was sprayed to the dog on the 2nd day, there were 60 lice and 35 tick fall off and dead and on the 3rd day there were 120 lice and 142 ticks that had fallen off from the body of the dog. On the 4th day, there were 156 lice and 158 ticks that had fallen off dead and on the 6th day, there was a decrease of parasites that had fallen off from the body of the dog, 10 lice and 15 ticks and on the 7th day no lice had fallen off and only 1 tick fell off from the dog's body. Based on the observation, on the 6th and 7th day nothing had fallen off because there was no parasite left in the body of the dog which means 2:2:2 formulation is considered effective as lice and tick remover.

Table 4. Significant Difference on the Number of Lice Removed Using the Three Concentrations

Number of days	No. of lice removed			No. of ticks removed		
	C1	C2	C3	C1	C2	C3
Day 1	0	0	0	0	0	0
Day 2	0	3	60	0	0	35
Day 3	2	3	130	0	0	142
Day 4	6	6	156	2	0	158
Day 5	10	6	45	2	0	156
Day 6	10	10	10	6	0	15
Day 7	0	12	0	0	0	1
Total	28	40	401	10	0	507
Note: C = Concentration						

Table 4 shows the number of lice and ticks removed from the dogs' bodies after applying the three different concentrations. As shown in the table, concentration 3 has the highest number of lice removed with a quantity of 401 compared with the other two concentrations. This implies that concentration three is the most effective formulation in removing lice from the dogs' bodies. The table also reveals that concentration three has the highest number of ticks removed with a quantity of 507 compared with the other two concentrations. This further implies that concentration 3 is also the most effective formulation in removing ticks from the dog's bodies.

Table 5. ANOVA Number of Lice Removed

	Sum of squares	Df	Mean Square	F	Sig.
Between Groups	12837.810	2	6418.905	4.770	.022
Within Groups	24222.857	18	1345.714		
Total	37060.667	20			

As shown in the table, the computed p-value is 0.022 which is lesser than 0.05. This implies that there is a significant difference on the number of lice removed from the dogs' bodies after applying the three different concentrations. This further implies that concentration three can greatly remove lice flick from the dogs' bodies compared with the other two concentrations.

Significant Difference on the Number of Ticks Removed Using the Three Concentrations.

Table 6. ANOVA Number of Ticks Removed

	Sum of squares	Df	Mean Square	F	Sig.
Between Groups	24007.524	2	12003.762	6.313	.008
Within Groups	34223.429	18	1901.302		
Total	58230.952	20			

As shown in the table, the computed p-value is 0.008 which is lesser than .05. This implies that there is a significant difference on the number of ticks removed from the dogs' bodies after applying the three different concentrations. This further implies that concentration three can greatly remove lice and ticks from the dogs' bodies compared with the other two concentrations.

CONCLUSION

Based on the given result shown in the tables, if there is an equal proportion of leaves of madre de cacao extract, sinta extract and coco milk prepared into oil has a high potency as animal lice and ticks remover and it also offer a safe alternative way of removing the animal parasites.

RECOMMENDATION

- It is recommended therefore that utilizing madre de cacao (*Gliricidia Sepium*) and Sinta (*Andrographis Paniculata*) leaves extract added with coco milk prepared into oil greatly help eradicate this parasite that are affected in the health of the said animals.

- The cost is affordable by low income family since said plants are available in the rural areas of the Philippines.
- Safe and environmental friendly.

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