

Rodenticide Effects of *Aegiceras corniculatum* (Saging-saging) Leaf Crude Extract

Manelyn Dela Cerna^{2,4}, Karina Milagros C. Lim^{1,4}, Flyndon Mark C. Dagalea^{1,4}, Abel Alejandro U. Flores, Jr.^{2,4}, Maria Judy M. Somoray^{1,4}, Olga DG. Unay^{3,4} and Manuela Cecille G. Vicencio^{2,4}

¹Department of Physical Sciences, College of Science, ²Department of Biological Sciences, College of Science,

³Department of Mathematics, College of Science,

⁴University Research and Development Services, University of Eastern Philippines, Catarman N. Samar

Email: manuelacecille@gmail.com

Abstract

The rodenticidal effects of the saging-saging leaf crude extract were evaluated under laboratory testing. **Methods:** A total of 36 mice were used in this study. Each administered by the saging-saging leaf extract at different concentration level of 50%, 75% and 100%. A commercial rodenticide is used as positive control. **Result:** The obtained result revealed that the crude extract of 100% level concentration of saging-saging caused mortality to the test animals. **Conclusion:** Therefore, saging-saging leaf crude extract could be used as rodenticide under laboratory testing.

Keywords: *Aegiceras corniculatum*, Concentration level, Crude extract, Rodenticide

INTRODUCTION

Pesticides have been used by humans for several centuries to kill the pests and insects which harm and attack on crops. Although pesticides benefit the crops, they also impose a serious negative impact on the environment that may lead to the destruction of biodiversity; such as many birds, aquatic organisms and animals are under the threat of harmful pesticides for their survival. Therefore, toxic plant extracts have been used as pesticides by humans for the reason that many of the plant species are known to have pesticidal properties (Fellows, 1979) and cheaper than the synthetic chemical pesticides (El-Gengaihi et al., 1997).

Aegiceras corniculatum which is commonly known as Black Mangrove or River Mangrove is one of the important species of mangrove in the Philippines. It is a species of shrub or a small evergreen tree mangrove belonging Myrsinaceae family with a distribution in coastal and estuarine areas.

Wei et al., (2011), reported the presence of tannins from *Aegiceras corniculatum* and studied antioxidant activity of freeze dried extracts of stem, bark, leaves, and root bark powder. Their result showed that methanolic extracts were showing good antioxidant activity and more concentration of phenolic compounds as compared to water and ethyl acetate. Furthermore, extracts and chemicals from mangroves are used in folkloric medicine for treatment of various diseases. The mangroves extracts also used as insecticides and pesticides (Bhandaranayake, 1998).

De la Cruz (1980), De la Cruz et al., (1984), and Gomez et al., (1986), as cited by Geron et al., (1988), reported that mangrove plants are good source of fish poison. In their study, they cited two natural occurring benzoquinone compounds isolated from the petroleum ether extracts of the mangrove species of *A. corniculatum*. The compound identified are response 92, (5-dihydroxy, -1, 4 benzoquinone) and newly found

5-O-methylumbelliferone (2-hydroxy-5-methoxy-3-undecyl-1,5-benzoquinone). This new compound exhibited fish toxicity and fungal inhibition.

Pluma (2005) stated that *Aegiceras corniculatum* bark extract has an effect to internal organs of albino mice. It has different effects to the albino mice such as face grooming, difficulty in breathing, poor balance and redness of extremities, petechiation, white spot in the liver, cyanosis in the kidneys, and hemorrhage in the spleen of the mice.

Agus (2003) found that the powdered seed of *Aegiceras corniculatum* is effective as molluscicidal against *Oncomelania quadrassii*. It was observed that it can kill *O. quadrassii* and was found to be poisonous. In this work, the rodenticidal effects of *Aegiceras corniculatum* crude leaf extract will be investigated.

METHODOLOGY

Collection and Extraction of Plant Sample

The leaf of *A. corniculatum* was gathered in the coastal area of Barangay Laoangan, San Roque, Northern Samar and were brought to the College of Science Research Laboratory at the University of Eastern Philippines.

The 200 mL extract was prepared from 750 gram leaves of *A. corniculatum*. A blender was used to make the sample finer and to get the maximum amount of pure extract. The ground material was put in cheesecloth and squeeze in order to get the extract. Then, it was placed in amber-colored bottle with cover and was stored in a refrigerator.

Preparation of the Different Concentration Levels

There were three (3) levels of concentrations of *A. corniculatum* leaf extract: the 100% concentration, 75% concentration, and 50% concentration. A commercial rodenticide was used as a positive control.

Preparation of the Test Animals

This experiment used 36 mice regardless of sex. The experimental animals were placed in a screen cage. They were given 2 grams of feed and 2ml of water twice a day, a six in the morning and six in the evening.

Administration to the Test Animals

Twelve cages served as experimental units, each containing three albino mice. The mice were treated 100%, 75%, and 50% of *A. corniculatum* leaf extract and 100% commercially available rodenticide as positive control.

Administration of test substance was one block at a time at 7am after feeding the experimental animals. To test the extract to the animal is 0.1ml per 1g body weight of the mice. To administer, the mice was held on its back neck by the right hand and were allowed to relax. Once relaxed, the test substance will be administered. It was injected in the neck of the experimental animal. A 2mL injection syringe was used. After each administration, the experimental animal was placed back to its cage for further observation and data gathering procedure. After the administration of different level of concentration of the extract, the observation was followed and recording of data were after 6 hours, 12 hours and 18 hours' exposure of the experimental animals to the test substance and the mortality rate was recorded.

RESULTS AND DISCUSSION

The rodenticidal effect of *A. corniculatum* was determined on the experimental animal based on the following factors: the mortality rate of albino mice per hour per treatment, the effectiveness of the different concentration on albino mice and the significant difference between the most effective concentration and the commercial rodenticide in terms of mortality.

Mortality Rate

The mortality rate of Albino mice after exposure at varying concentration level of *A. corniculatum* leaf extract is presented in Table 1. As shown in the table, after 6 hours of observation, only the 75% and 100% level concentration worked well on the albino mice by having a mortality rate of four (4) mice died for the 75% concentration and 9 mice died for 100% concentration.

Table 1. Mortality Rate of Albino Mice Corresponds to the Number of Hours

Concentration Level	Mortality Rate		
	6 hours	12 hours	18 hours
50%	0	33.33%	33.33%
75%	44.44%	55.55%	0
100%	100%	0	0
Commercial rodenticide	0	11.11%	55.55%

Similarly, the 75% concentration also shows a mortality rate up to 12 hours of observation by having five (5) mice died with a mortality rate of 55.55%. It was followed by the 50% concentration by having three (3) mice died with a mortality rate of 33.33%. Commercial rodenticide got the lowest percentage by having only one (1) mouse died with a mortality rate of 11.11%.

After 18 hours of observation, the 50% concentration also worked well by having three (3) mice died with a mortality rate of 33.33%. Commercial rodenticide has five (5) mice died with a mortality rate of 55.55%.

Thus, the table revealed that the produced rodenticide from *A. corniculatum* worked faster than the commercial rodenticide. It also shows that the mortality rate of albino mice corresponds to the number of hours.

Concentration Which is Most Effective on Albino Mice

Table 2. F-test Computed Value Between the Most Effective Concentration and Positive Control

Source of the Variance	Degree of Freedom	Sum of Squares	Mean Squares	F-value		Interpretation
				Computed	Tabular	
Between groups	2	6.88	2.29	17.62	3.40	Significant
Within groups	24	3.12	.13			

Total	26	10				
-------	----	----	--	--	--	--

Table 2 shows the result of F-test. Table revealed that there is a significant difference between the different concentration levels. The F-computed value of 17.62 is greater than F-tabular value of 3.40 at 0.05 level of significant with 2 and 24 degrees of freedom which implies that the efficacy of the *A. corniculatum* leaf extract as a rodenticide varies according to the concentration level.

Table 3. Significant Differences Between the Different Level of Concentration

Between Treatment	F'	(F 0.05) (K-1) (3.40) (2)	Interpretation
T1 vs T2	6.33	6.8	Not Significant
T1 vs T3	49.7	6.8	Significant
T2 vs T3	20.28	6.8	Significant

As shown in the table 4, that there is a significant difference between T1 and T3, and also between T2 and T3. Both of them can be a good rodenticide. However, T1 and T2 have no significant difference in terms of mortality.

Table 4. Significance Between the Most Effective Concentration and Positive Control

Level of Significance	Degree of Freedom	t-computed	t-tabular	Interpretation
0.05	13	13.58	1.771	Significant

Table 4 shown the significant difference between the most effective concentration level of the leaf extract compared to positive control. As shown in the table, the computed t-value is greater than the tabular value. Thus, we can say that the null hypothesis is rejected which says that there is no significant difference between the most effective concentration level of the leaf extract and the commercial rodenticide in terms of mortality.

The findings implied that under laboratory conditions, the *A. corniculatum* leaf extract is more toxic that commercial rodenticide.

CONCLUSION

The efficacy of the *A. corniculatum* leaf extract as a rodenticide varies according to the concentration level. Thus, *A. corniculatum* leaf extract is more effective than the commercial rodenticide. It can be used as rodenticide.

REFERENCES

1. Agus, Roma. 2003. The Molluscicidal Effect of *Aegeceras corniculatum* Linn. (Saging-saging), BS Biology Thesis, College of Science, University of Eastern Philippines, University Town, Catarman, Northern Samar.
2. Bandaranayake, W. Traditional and medicinal uses of mangroves. *Mangroves and Salt Marshes* 2, 133–148.
3. De La Cruz, A.A., Gomez, E.D., Miles, D.H., Cajipe, G.J.B. and Chavez, V.P. 1984. Toxicants from mangrove plants: bioassay of crude extract. *Journal of Ecological and Environmental Science* 10: 1–9.
4. De La Cruz, Armando A. and Hackney, Courtney T. 1980. In Situ Decomposition of Roots and Rhizomes of Two Tidal Marsh Plants. *Ecology: Ecology Society of America*. Volume 61, Issue 2, pp. 226-231.
5. EL-Gengaihi, S.E., Dimetry, N.Z., Mohamed, S.M., 1997. Chemical and biological investigation of harmful plant. 2-Alkaloidal investigation. *J. Appl. Entomol.* 12 (3), 165–167.
6. Fellows, L.E., 1979. Plant secondary compounds as a chemical defense. In: Wright, E.N. (Ed.), *Bird Problems in Agriculture*. pp.188–195.
7. Gomez, E.D., De La Cruz, A.A., Chavez, V.B., Miles, D.H. and Cajipe, G.J.B. 1986. Toxicants from mangrove plants: 2. Toxicity of aqueous extracts to fish. *Philippines. Journal of Science* 115: 81–89.
8. Pluma, Julie. 2005. The Effects of *Aegeceras corniculatum* Linn. (saging-saging) on the internal organs of the Albino Mice. BS Biology Thesis, College of Science, University of Eastern Philippines, University Town, Catarman, Northern Samar.
9. Wei, Lee Seong, Wee, Wendy, Siong, Julius Yong Fu and Syamsumir, Desy Fitriya, 2011. Characterization of Antimicrobial, Antioxidant, Anticancer Properties and Chemical Composition of Malaysian *Andrographis paniculata* Leaf Extract. *Pharmacologyonline* 2: 996-1002.