

PYTOCHEMICAL SCREENING AND PHARMACOLOGICAL TESTING OF "SANGGUMNY" ORCHID (*Dendrobium superbum* Reichb.)

Solita Soliven-Banet

ABSTRACT

*This study primarily aimed to perform phytochemical screening and pharmacological testing on a locally abundant orchid that grows widely in Cervantes, Ilocos Sur commonly known as "Sanggumny" orchid (*Dendrobium superbum* Reichb.) This experimental investigation determined the chemical substances present in both the stems and leaves and determined the pharmacological effects of the ethanol extract using male Swiss mice as test animals in terms of analgesia and toxicity.*

*The following chemical substances like alkaloids, glycosides, tannins, saponins and sterols were found to be present in both the stems and leaves of "Sanggumny" orchid (*Dendrobium superbum* Reichb.)*

There are pharmacological effects of the ethanol extract (screened substances) using male Swiss mice as test animals.

Under the conditions of this test, the ethanol extract showed that it has an analgesic activity when administered orally to male Swiss mice; it produced a 6.25%, 31.25% and 56.25% protection against writhing at 500, 1000 and 1,500 mg/kg, respectively.

The approximate Lethal Dose (ALD) of the sample ethanol extract of "Sanggumny" orchid administered orally in male Swiss mice is 2,500 mg/kg. Toxidrome ranged from ptosis, decreased motor activity and convulsion leading to the deaths of male Swiss mice.

In the autopsy findings, all mice that died immediately and those sacrificed and autopsied after fourteen (14) days had grossly normal findings.

INTRODUCTION

The municipality of Cervantes, Ilocos Sur is very fortunate because of the abundance of the so-called aristocrat of the plant world, the "orchid." This plant excites wonder because of its complex structure. Cervantes is long remembered because of this and because it has a suitable climate for the growth of orchids.

The municipality of Cervantes is situated within the Cordillera mountains lying at the southeastern tip of the province of Ilocos Sur. It is bounded by Tadian, Mt. Province on the east, Mankayan and bakun, Benguet on the south; Alilem, Ilocos Sur on the southwest; Sigay, Ilocos Sur on the west; Gregorio del Pilar, Ilocos Sur on the northwest; and Quirino, Ilocos Sur (Angaki) on the north.

Cervantes is 399 kilometers northeast of Metro Manila, 169 kilometers east of Vigan, the Capital town of the Province, 123 kilometers north of Baguio City, the summer capital of the Philippines, and 19 kilometers north of Mankayan, Benguet, the northeast minor urban center of the town.

Due to locatipn and natural barrier, the town is almost completely isolated from the rest of the Ilocos Region. Poverty deprives some of the residents of their basic needs. Deprivation makes them susceptible to diseases. It is imperative, therefore, that easy, reliable and cheap means of curing illness be made available to the masses.

It is time, therefore, to give medicinal plants just scientific treatment not only as a legitimate area of scientific inquiry but also as an issue for national concern. We can think of reasons why:

1. Plant preparations are the only medicine many of our rural folks have easy access to notwithstanding miniature pills and bottled drugs.
2. There is a need to develop local sources of drugs in the name of saving dollars and a self-reliant economy.
3. Medicinal plants have their place in modern medicine.

With the reasons stated above, the researcher was greatly interested to look into the medicinal values of indigenous "sanggamay" orchid that grows abundantly in Cervantes, Ilocos Sur. If found to have medicinal properties, it will then attract scientists to discover the application of its therapeutic properties thus it will be a source of remedial agents for the treatment of quite a number of ailments. *Dendrobium superbum Reichb.* is not yet included in the list of medicinal plants, so if found to have medicinal properties then it may also be added to the compilation of data and documentation of Philippine Medicinal Plants.

OBJECTIVES OF THE STUDY

This study primarily aimed to perform phytochemical screening and pharmacological testing of "sanggumay" orchid.

It determined some chemical substances which have medicinal properties present in the stems and leaves of "sanggumay" orchid (*Dendrobium superbum Reichb.*)

It also determined the pharmacological effects of the screened substances on the male Swiss mice as test animals in terms of analgesic and toxicity effects.

SCOPE AND DELIMITATION

This study was limited only to the phytochemical screening and pharmacological testing of "sariggumay" orchid.

Only the stems and leaves were used in the experimental investigation.

The determination of the chemical constituents was limited to the qualitative rather than the quantitative analysis.

In the pharmacological testing, it was limited to test the analgesic and toxicity effects of the test drug from the stems and leaves of "sanggumay" orchid using male Swiss mice as test animals.

REVIEW OF RELATED LITERATURE

This section includes a summary of readings and studies which the researcher considered relevant to the study.

Abilith (1984) conducted a study on phytochemical and microbiological investigation of the leaves of *leucosyke hispidissima* (dael). Her findings revealed that the plant contains flavonoids, tannins, and polyphenolic compounds as well as traces of saponins, triterpenoids and anthraquinones. Her microbiological assay done with the crude extract and the fraction from the chromatographic separation showed anti-microbial activity against Gram-negative bacteria except those fraction that appeared to contain green components only.

Estrada (1989) conducted a study on Pharmacological and Toxicologic Analyses of "Lagundi" (*Vitex negundo* linn). The pharmacologic analysis showed that one hundred percent aqueous extract of "lagundi" has lethal dose 50 of 103 mg/kg. body weight in the adult albino mouse. Contractions of isolated tissue preparations of the rat duodenum, cat tracheal chain, and rat uterus were depressed. A bioassay method using the rat duodenum for the potency of batches of "lagundi" was established.

RESEARCH DESIGN

The figure presents the research paradigm.

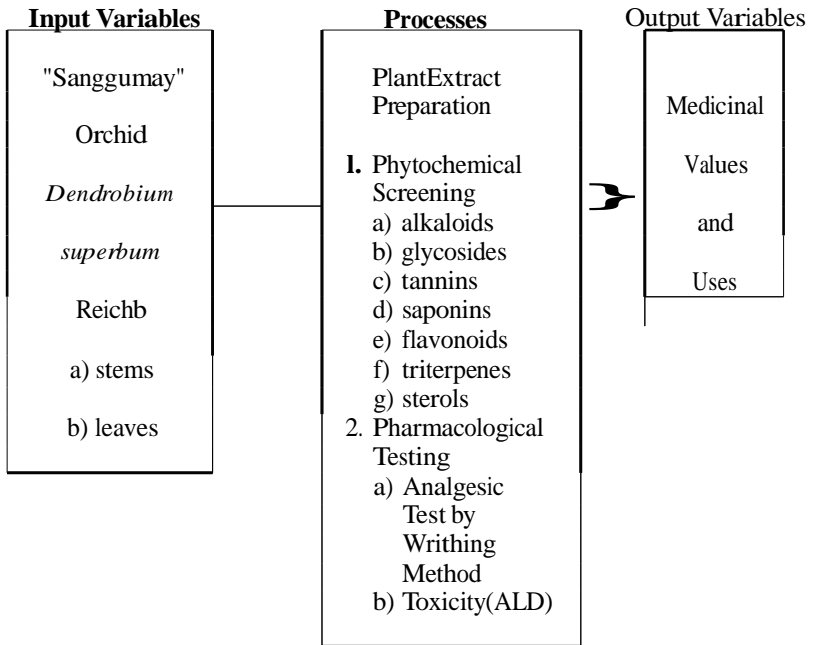


Figure 1

METHODOLOGY

Design of the Study

This study made use of the experimental research design in actual laboratory set-up.

Phase I. The gathering of fresh stems and leaves of "sanggumay" orchid; the air drying process of the stems and leaves for a month and the extraction process (ethyl alcohol) were included in the phase.

Phase II. This phase included the phytochemical screening of the stems and leaves of "sanggumay" orchids.

The following tests were used:

- Mayer's Test for the determination of the presence/absence of alkaloids.
- Fehling's Test for the determination of the presence/absence of glycosides.
- Gelatin Test for the determination of the presence/absence of Tannins
- Froth Test for the determination of the presence/absence of Saponins
- Color Test for the determination of the presence/absence of flavonoids

Liebennann-Burchard Test for triterpenes and sterols.

Phase III. This included the pharmacological testing.

Experimental Animals

Healthy male Swiss mice each weighing 17 to 30g at the start of the experiment were kept in individual observation cages. All animals were fasted from food and water 16 hours before the test. Two hours after administration of the drug, the animals were given free access to food and water.

Analgesic Test by Writhing Method (PBQ)

Three increasing doses of the test material were given orally to the animals in groups of five including the negative (normal Saline solution) and positive (aspirin) controls. Thirty minutes after dosing, the mice were injected intraperitoneally with phenylbenzoquinone (PBQ). The number of writhing and number of animals without writhing **were** closely observed.

$$\text{Percent Protection} = \frac{(\text{Experimental} - \text{Control}) \times 100}{\text{Control}}$$

Approximate Lethal Dose (ALD)

Seven increasing dose of the test substance were given orally to **male Swiss** mice in groups of two including the control to determine the dose that causes death to the experimental animals.

RESULT AND DISCUSSION

Phytochemical Screening of "Sanggumay" Orchid

Table 1

Substance Determined	Method Used	Results	
		Stems	Leaves
1. Alkaloids	Mayer's Test	+	+
2. Glycosides	Fehling's Test	+	+
3. Tannins	Gelatin Test	+	+
4. Saponins	Froth Test	+	+
5. Flavonoids	Color Test		
6. Triterpenes	Liebermann-Burchard Test		
7. Sterols	Liebermann-Burchard Test	+	+

Legend:

+ = presence of substance determined

- = absence of substance determined

INTERPRETATION OF FINDINGS

Findings of this study show that the plant contains medicinal properties like alkaloids, glycosides, tannins, saponins and sterols. The presence of these therapeutic substance confirmed the purported use of "Sanggumay" orchids as medicinal plants.

Pharmacological Screening

Table 2. Results of Analgesic Test by Writhing Method

Group No.	Drug	Dose mg/kg	n	No. of Mice wlo Writhing/ Total No. of Test Animals	No. of Writhing	Percent Protection
I	Control	0	4	0/4	16	
II	Sanggumay	500	4	3/4	15	6.25
III	Sanggurnay	1000	4	2/4	11	31.25
IV	Sanggumay	1500	4	2/4	7	56.25
V	Aspirin	200	4	4/4	0	100.00

Percent Protection = $100 - [(Experimental \times 100)/control]$

e'

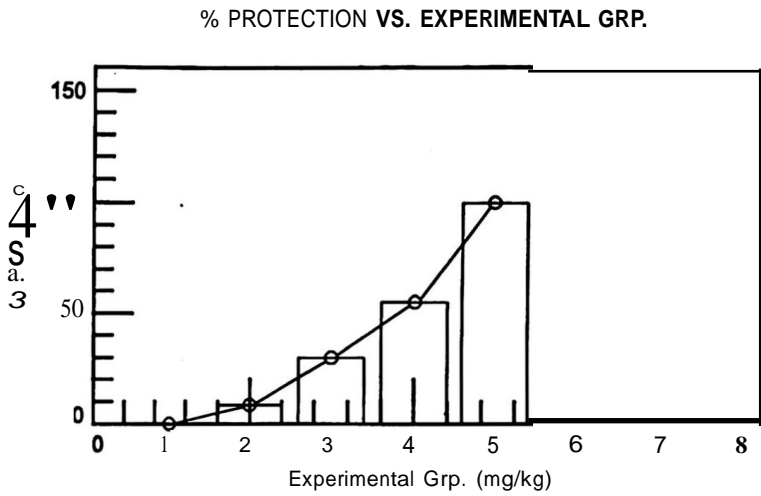


Figure 2

Group Showing the Results of Analgesic Test
by Writhing Method (PBQ) Using Male
Swiss Mice as Test Animals

INTERPRETATION OF FINDINGS

Under the condition of this test, the ethanol extract of "Sanggumay" orchid showed that it has an analgesic activity when administered orally to male Swiss mice, it produced a 6.25%, 31.25% and 56.25% protection against writhing at 500, 1,000 and 1,500 mg/kg, respectively. However, the dose of 500 mg/kg did not produce significant protection.

The ethanol extract dose (mg/kg) of the experimental group is directly proportional to the percent protection of the male mice. (See Figure 2) This showed that as the dosage increased, the greater the percent protection of the male Swiss mice.

As long, as it is below the toxidrome which is 2,500 mg/kg, the higher the dosage injected intraperitoneally to male Swiss mice, the more is the percent protection against writhing.

The positive control (aspirin) showed the highest percent protection.

Table 3. Results of Approximate Lethal Dose (ALD) Using Male Swiss Mice as Test Animals

Group No.	Dose mg/kg	n	No. of Mice with Positive Signs Deaths)/Total No. of Mice Tested				
			Day 1	Day 2	Day 3	Day 4	... Day 14
1	0	2	0/2	0/2	0/2	0/2	0/2
2	1,000	2	0/2	0/2	0/2	0/2	0/2
3	2,000	2	0/2	0/2	0/2	0/2	0/2
4	2,500	2	2/2				
5	3,000	2	2/2				
6	3,500	2	2/2				
7	4,000	2	2/2				
8	8,000	2	2/2				

n = number of mice tested

Table 4. Behavioral Observation/Toridrome of Oral Administration of **Ethanol** Extract of "Sanggumay" Orchid in Male Swiss Mice

Dose mg/kg	n	Observation
0	2	No effect
1,000	2	Five (5) minutes after dosing, the mice manifested ptosis and decreased motor activity which lasted for one (1) hour and fourteen (14) minutes. No death occurred within the fourteen (14) days period.
2,000	2	
2,500	2	Four (4) minutes after dosing, the mice manifested ptosis and decreased motor activity and convulsion leading to the death of mice. Two (2) mice died within two (2) hours and thirty (30) minutes.
3,000		Four (4) minutes after dosing, the mice manifested ptosis and decreased motor activity and convulsion leading to the death of all mice. All mice died within one (1) hour and twenty (20) minutes after dosing.
3,500		
4,000		
8,000		

The Approximate Lethal Dose (ALD) of the ethanol extract of "Sanggumay" orchid administered orally in male Swiss mice is 2,500 mg/kg. Toxidrome ranged from ptosis, decreased motor activity and convulsion leading to the deaths of mice.

Autopsy Findings

All mice that died immediately and those sacrificed and autopsied after fourteen (14) days had grossly nonnal findings.

CONCLUSIONS

1. The ethanol extracts of the stems and leaves of "Sanggumay" orchids (*Dendrobium superbum* Reichb.) contain therapeutic substances such as alkaloids, glycosides, tannins, saponins and sterol. This implies that the plant is a good source for the treatment of hypertension, tumor, congestive heart failure, wounds, sores, boils, stomach ache, diarrhea, sore throat, burns, ulcer, nasal congestion, hemorrhage, malaria and other rectal disorders.
2. The ethanol extract of "Sanggumay" orchid has analgesic effect when administered orally to male Swiss mice.
3. The ethanol extract of "Sanggumay" orchid has toxicity effect when administered orally to male Swiss mice. The Approximate Lethal Dose is 2,500 mg/kg.

RECOMMENDATIONS

1. A follow-up study should be conducted to quantify, isolate and identify the type of alkaloids, glycosides, tannins, saponins and sterols present in the stems and leaves.
2. The roots and flowers of the plant are recommended for phytochemical screening and pharmacological testing.
3. The roots, stems, leaves and flowers of the plant are recommended **for** microbiological assay.
4. Further studies on the plant's therapeutic properties are recommended to be undertaken by interested drug companies.
5. "Sanggumay" orchid is recommended to be listed in the compilation and documentation of Medicinal Plants in the Philippines through the National Research Council of the Philippines, Department of Science and Technology and the University of the Philippines.

BIBLIOGRAPHY

A. Books

- Capal et. al., *A Manual on Extraction Procedures and Microbiological Assay of Medicinal Plants*, Manila DOST, 1992.
- Domer, Floyd, *Animal Experiments in Pharmacological Analysis*, Springfield, Illinois: Charles Thomas Publishing Co., 1971.
- Goddman, L.S. and A. Gilman. *The Pharmacological Basis of Therapeutics*. Toronto, Canada: The McMillan Co., 1985.
- Guevara and Recio, *Phytochemical, Microbiological and Pharmacological Screening of Medicinal Plants*. U.S.T. Printing Press, 1985.

B. Journals

- Beloy, F. et. al. Investigation of Some Philippine Plants for Microbiological Plants, *Philippine Science Journal*, 1976.
- Isleta, Nenita I. "Herdin Current Awareness" *Herdin* (P.C.H.R.D.: April-June 1992).

C. Unpublished Materials

- Aguirre, Winston Pe "Town Plaza", *Municipality of Cervantes, Ilocos Sur*, 1984.
- Akilith, Carolyn "Phytochemical and Microbiological Investigation of the Leaves of *Leukosyke hispidissima* (dael)" Unpublished Master's Thesis. De La Salle University, 1984.