International Journal of Biomedicine & Life Sciences
Vol. 8, No. 1, 2023, pp. 15-19
https://ijbls.ielas.org/index.php/ijbls/index
ISSN (online) 2545-4129

MOLLUSCICIDAL POTENTIALS OF BUWA INTSIK (*ADONIDA MERRILLII*)

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Received: 2022-12-31 Accepted: 2023-02-28 Published online: 2023-03-12

Abstract

This study is designed to determine the molluscicidal potentials of buwa intsik (Adonida merrillii). Young, matured, and ripe fruits of A. merrillii were crashed and fermented for three weeks and used to treat farm golden kuhol. A. merrillii, which belongs to the order arecales and family palmae, is found to contain arecoline and arecal alkaloid which inhibits acetyl-cholinesterase, and acid and alkaline phosphatase activities in the nervous tissue. Exposure to these known alkaloids attacks the central nervous system leading to the death of the golden kuhol. Statistical analyses showed that fermented ripe A. merrillii fruit was the best treatment in treating golden kuhol. Moreover, time of death of the golden kuhol in the fermented ripe fruits was the fastest among the three treatment conditions. Therefore, buwa intsik poses a great potential as molluscicide.

Keywords: Molluscicide, Golden Kuhol, Buwa Intsik, Manila Palm, Dwarf Royal, Christmas Palm Tree, Adonida merrillii, Moma, Arecoline.

1. Introduction

Buwa Intsik (*Adonida merrillii),* commonly known as *manila palm, dwarf royal, and christmas palm tree,* belongs to the kingdom plantae, phylum tracheophyta, class liliopsida, order arecales, and family palmae. This plant is used commonly as an ornamental plant as it adds a touch of beauty to any space being a super popular for landscapes and containers. However, it is now a threatened species in most urban areas due to industrialization and other environmental stresses. Aptly, this plant is seen to be of no more use aside from the foregoing.

Phytochemical analysis of *A. merrillii* noted that it contains alkaloids particularly arecoline, anthraquinones, coumarins, flavonoids, saponins, sterols, tannins, and terpenes (Johnson, 1998). The foregoing findings reveal that the chemical compositions of this species resemble with the components of *moma (Arecha catechu Linn.)* Preliminary phytochemical screening reported that *moma* crude extract and its aqueous fraction ascertained the qualitative presence of alkaloids, anthraquinones, coumarins, flavonoids, saponins, sterols, tannins, and terpenes (Marastoni, 2004; Edeoga et al., 2005; Huang et al., 2010; Liu et al., 2011; Khan et al., 2011; Amudhan et al., 2012). The four major alkaloids isolated in *moma* are arecoline (7.5 mg/g weight), arecaidine (1.5 mg/g weight), guvacoline (2.0 mg/g weight), and guvacine (2.9 mg/g

weight) (Nai-shin Chu, 2001). All these alkaloids are chemically related. Arecoline is colorless, volatile resembling nicotine which is believed to significantly inhibit the acetyl-cholinesterase (AChE), and acid and alkaline phosphatase (ACP/ALP) activity in the nervous tissue (Marastoni et al., 2004; Amudhan et al., 2012). Moreover, specific arecal alkaloids of *moma* and *buwa intsik* were identified that acts as a competitive inhibitor of GABA receptors (Lodge et al., 1999; Sachelian, 2016).

The crux is: despite the presence of studies on the phytochemical analysis and psychoactive activities of arecales and palmae species extracts, no studies had been conducted as to the molluscicidal potentials of *buwa intsik*. This investigation involves the use of the identified chemical entities in mediating with the ill-giving mollusks that threatens rice plants in its early stage of planting, i.e., direct seeding or transplanting. Moreover, this study documents the development of an odorless, low-cost, yet effective molluscicide from indigenous plant species.

2. Materials and Methods

Design. This study employed the Completely Random Design (CRD) as its experimental units were essentially homogeneous with small number of treatments. Treatments were assigned to experimental units at random:

Treatment 1 – Young Fruit (Fruit pulp is green and fruit nut is soft to tender.)
Treatment 2 – Matured Fruit (Fruit pulp is green to dark green and fruit nut is moderately hard to hard.)
Treatment 3 – Ripe Fruit (pulp is yellowish to reddish and fruit nut is hard and ready to germinate.)

Collection of Test-plant Sample. There are three types of *buwa intsik* fruits used in this study: young (pulp is green and fruit nut is soft to tender), matured (pulp is green to dark green and fruit nut is moderately hard to hard), and ripe (pulp is reddish and fruit nut is hard and ready to germinate). *Buwa intsik* fruits were freshly-picked, washed, and classified as young, matured, and ripe. Pulp are separated from its nut. Nuts were cut into quarters and crashed.

Fermentation of *Buwa Intsik.* Stored in a container, crashed *buwa intsik* nuts were fermented using the following proportion: 500 g of *buwa intsik* nuts, 500 mL distilled water, and 250 g of brown sugar. Fermentation is done for three weeks.

Collection of Test-mollusk Species. Mollusks were collected from the farm and classified as small, medium, and large. Twenty mollusks were used in each of the treatment conditions.

Testing the Fermented *Buwa Intsik* for its Molluscicidal Potentials. Biological assay was conducted from the third week of fermentation. Mollusks were classified as small, average, and large. *Buwa intsik* extracts were sprayed to mollusks collected from the rice field.Time of death was recorded in each type of mollusks treated with the three types of *buwa intsik* extracts.

***Molluscicidal Efficacy Test**:* Twenty *golden kuhol* of varying sizes were collected from the farm and subjected with the developed molluscicide from *buwa intsik.* Number of dead *golden kuhol* was recorded at the end of five minutes exposure. Time of death (in seconds) was also recorded. Data were treated with ANOVA and Tukey simultaneous comparison.

3. Results and Discussion

Table 1. Number of Dead *Golden Kuhol* Treated with *Buwa Intsik* Extract[2]

Replications	Treatment Conditions		
	Young[ab]	Matured[abc]	Ripe[bc]
1	16	18	17
2	17	18	18
3	16	18	19
4	15	18	18
F-value: 5.67; p-value=.0266			

Results in the foregoing table imply that a fermented fruit of buwa intsik is a potential molluscicide. However, it shows that both matured and ripe fruits of the *A. merrillii* posted comparable results. This result is attributed to the fact that arecoline, an arecal composition of palm species, is developed as fruits get mature.

Table 2. Average Time of Death of *Golden Kuhol* Treated with *Buwa Intsik* Extract[3]

Replications	Treatment Conditions		
	Young[ab]	Matured[abc]	Ripe[bc]
1	1.68	1.74	1.91
2	1.69	1.72	1.87
3	1.79	1.75	1.90
4	1.88	1.66	1.89
F-value: 9.27; p-value=.0065			

Results in the foregoing table show the average time of death of the test-species on the developed molluscicide. It shows that all treatment conditions give good results; however, results in the matured and ripe fruits give better results.

[2] means of the same letter found in row are significant at .05 level of significance
(Tukey simultaneous comparison t-values (df=9)
[3] means of the same letter found in row are significant at .05 level of significance (Tukey simultaneous comparison t-values (df=9)

Aptly, the exposure to arecoline (the active component of *A. merrillii* nut) significantly inhibit the acetyl-cholinesterase (AChE), acid and alkaline phosphatase (ACP/ALP) activity in the nervous tissues of the subject species (Marastoni et al., 2004; Amudhan et al., 2012). This phenomenon attacks the central nervous system that leads to the death of the mollusks, the *golden kuhol*. Arecoline in *buwa intsik* intensifies as its seeds mature and ripe; hence, potential to treat mollusks.

3. Conclusion

A. merrillii, which belongs to the order arecales and family palmae, is found to contain arecoline and arecal alkaloid which inhibits acetyl-cholinesterase, and acid and alkaline phosphatase activities in the nervous tissue. Exposure to these known alkaloids attacks the central nervous system leading to the death of the *golden kuhol*. Statistical analyses showed that fermented ripe *A. merrillii* fruit was the best treatment in treating *golden kuhol*. Therefore, *A. merrillii* is potential to treat *golden kuhol*.

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