

Coconut Sap and Calamansi Extract as an Alternative Weed Killer

¹Rey Avila Mangarin, ²Angelyn Cuizon, ³Forreli Tresfuentes, ⁴Kyle Flores, ⁵Ma. Elaisa Baugbog, ⁶Raquel Abaquita, ⁷Angel Cris Ermita, ⁸Frazer Axel Rasucay, ⁹Jovany Gleen Allawan

¹Consultant, RAMyeR Research Consultancy Services

^{2,3,4,5,6,7,8}Student, Sto. Tomas National High School

⁹Faculty, UM Panabo College

DOI: <https://doi.org/10.51584/IJRIAS.2024.90310>

Received: 23 February 2024; Accepted: 01 March 2024; Published: 29 March 2024

INTRODUCTION

Weeds grow everywhere and most of them just bother the cleanliness of nature. These timeserving plants occupy spaces between crop sequences and crop within rows (Webber & Shrefler, 2009). People use synthetic chemicals to control the weeds and those chemicals can make the affected areas toxic especially the soil (Gardener & Fravel, 2002). Since synthetic chemicals are not eco-friendly, biological method is more preferable because it is selective with no side-effects, and is relatively cheap and self-propagating when it comes to biological control agents.

Coconut was said to be the versatile fruit. It can work in various ways and its sap is a good acid that is a good component for weedicides. Coconut sap consists of acetic acid that is somewhat can kill weeds (Lovejoy, 20). It has very low mammalian toxicity, in oral and in inhalation. Kalamansi extract is very acidic and contains 5.5 % of citric acid. Its property stripped the cuticle or the protective coating right off the leaves of the weeds and let the acidic ingredients burn out the foliage (Valicoff, 2014). These two chemical properties are an alternative solution in killing weeds and it is particularly useful in killing weeds if it is directly sprayed.

Since the researchers will make an organic weed killer, they will ferment the coconut sap to be more effective because it will become more acidic than the fresh one (Samarajeewah, 2003). It is said that when you ferment it, the acetic acid will increase from 1.5% to 5%.

The researchers will make an alternative weedicide and they use the carabao grass as their subject. Carabao grass (*Paspalum rengeeri Steud*) is a kind of grass that is very common in the American tropics and tropical countries especially in Southeast Asia. It can be found in abundance in countries like the Philippines. This kind of grass vigorously creeps on the ground with long stolon. As it spreads through the ground, roots will form at the nodes and this allows the grass to branch to branch out quickly.

For organic farmers and gardeners, creating a non-toxic soil is what they preferred to have, and with the use of organic weedicide that can kill the bothering weeds, it can also maintain the richness of the soil. The nutrients in the rich soil is the key to growing great fruits and vegetables, abundant flowers, and long-lived ornamental trees and shrubs, and the overall fertility and viability of the soil, rather than the application of weed killers as quick fixes, is at the very heart of organic gardening (Staff, 2017).

The combination of fermented Coconut (*Cocos nucifera*) sap and the Calamansi (*Citrofortunella x microcarpa*) extract provided the acids that can destroy the weeds. According to Lovejoy (2016) 20% of acetic acid can kill weeds, but since the fermented coconut sap has only 5% that is strong not enough, citric acid from calamansi is added to be more successful to kill weeds. The citric acid is 42 times stronger than acetic acid which is present in calamansi.

The best time to apply a weedicide is when their stomata is open and that happens early in the morning or in the late evening (Sela, 2016). The foliar weedicide spray is the best for decreasing the growth of weeds (Jamal and Chaudhary 2007).

This study can help to nurture the health of the nature. Through this study, farmers can see that organic farming is better than using chemicals that can be found at the market, which is the synthetic one. Organic materials are eco-friendly and inexpensive, it can also be found everywhere especially the Coconut and Kalamansi that is used in this study. This study proves that organic agriculture is more ecologically sustainable and beneficial.

The researchers aim to:

1. Determine the effectiveness of Coconut sap and Calamansi extract as an alternative weed killer.

Based on the specific objectives, the following null hypotheses (Ho) were formulated:

1. Coconut sap and Calamansi extract are not effective as an alternative weed killer.

REVIEW OF RELATED LITERATURE

Organic production is a complete system designed to enhance the productivity of varied communities within the agro-system, including soil organisms, plants, livestock and people. The principal goal of organic production is to developed enterprises that are sustainable and harmonious with the environment (Martin, 2009). According to Snell (2015), organic weed control methods have varying degrees of effectiveness and cover a broad range of costs financially and in time.

Alternative weed killers are not systemic but considered contact herbicide. They work by burning plant foliage, but only foliage that is contacted by the product. They only kill weeds that have emerged and have no residual activity on those emerging after application. Most are fast acting when the temperature is high, and particularly when the humidity is low (Fiola, 2017).

All acetic acid treatments quickly caused a dramatic discoloration and browning of foliage on all plant species. In a few hours, the foliage became blackened and water-soaked. No twisting or yellowing was seen for any treatment or species. After 24 hours, control in all plots with an acetic acid product was 95% to 100% (Chinery, 2008).

According to Lovejoy (2013), several weed control products with concentrates of lemon and orange oils are also available to home gardeners. Citrus based and Vinegar based are the perfect combination for an organic weed killer.

METHODOLOGY

This chapter presents the methods in making the foliar fertilizer. It was shown here the materials needed and the process in making it.

The primary research method to be used in this study will be quasi-experimental because it is used to analyze and observe the efficacy of the Coconut oil and Kalamansi extract as an alternative weed killer which is applicable to the study and it involves selecting groups upon which the alternative weedicide will be tested, without random pre-selection processes.

We used empty bottle container to be the container of the alternative weed killer. The knife was used to slice

the Calamansi, one of the materials for the alternative weed killer. Calamansi extract was used to complete the ingredient on making the alternative weed killer.

The research study emphasizes the use of coconut sap and calamansi extract. It was conducted at Fd. Rd. #5, Sto. Tomas, Davao del Norte, it is where the plots are located. The coconut sap is also collected and fermented at that place. The calamansi was collected at Luna, Kapalong where the residence of one of the researchers is located. The experiment was conducted at Sto. Tomas National High School due to the capacity of having laboratory apparatus that is very useful to complete the study.

The researchers used 5 weed control treatments. They prepared 5 plots of weeds and name those Plot A, Plot B, Plot C, Plot D, and Plot E. Plot A considered as the first treatment and the researchers did not apply weed killers to the weeds, Plot B was applied with the commercialized weed killer, Plot C was applied with Coconut sap, Plot D was applied with Calamansi extract, and Plot E was applied with both Coconut sap and Calamansi extract. They used one variety of weed which is the Carabao grass (*Paspalum renngeri Steud*). The researchers gathered to the place where they agreed to make the research.

The researchers prepared the materials they gathered. They extracted 500mL of Kalamansi and get 500 mL coconut sap. They mixed the two and put it in a 1L container.

The product will be sent to laboratories for studying the chemicals present in the product. The safety of the product will be tested to make sure that the product could not affect human and animal health. Including to the test is the effectiveness of the product to prove that the product is effective as it is.

The data that will be gathered will be the number of days the weed wilt, variety of measure of liquid applied and based on the wilting stages of plants. The researchers will get the difference and mean gain for the variety of weed wilted and the effectiveness. In order to analyze the data, One-Way ANOVA test will be use. The researchers will use ANOVA Test because they will use more than two variables to identify if there is a significant difference between the set of groups.

RESULTS AND DISCUSSION

Table 1. The Effectiveness of the Different Treatments within Three Days when Scaled According to the Wilting Stages

Plot	Day 1	Day 2	Day 3	\bar{X}
A. No Treatment	0	0	0	0
B. Commercialize Weed Killer	3	4	6	4.33
C. Coconut Sap	1	2	3	2
D. Calamansi Extract	1	1	2	1.3
E. Coconut Sap and Calamansi Extract	2	4	6	4

Wilting stages:

0-Normal (No sign of wilting or water stress)

1-Slightly wilted (Slight leaf angle changes, but no folding rolling or changes in leaf structure.)

2-Intermediately wilted (Strong leaf angle change or visible change of leaf surface structure, but no cell

death)

3-Severely wilted (Very strong leaf angle change or change of leaf structure with beginning leaf necrosis)

4-Nearly dead (All leaves dead, but stem still alive; distinguished by color and elasticity.

5-Deciduous (All leaves actively shed, but stem still alive; distinguished by color and elasticity.)

6-Dead (All above ground parts dead.)

Shown in Table 1, the wilting stages reached of the same weeds with different treatment. The commercialized weed killer has the best performance with the mean 4.33 while the lowest performance is the no treatment with the mean of 0.

Table 2. Difference Between the Treatments

Plot	Mean	SD	F-value	p-value
A. No Treatment	0.00	0.00	1.345	.297
B. Commercialized Weed Killer	4.33	1.53		
C. Coconut Sap	2.00	1.00		
D. Calamansi Extract	1.30	.577		
E. Coconut Sap and Calamansi Extract	4.00	2.00		

$\alpha = 0.05$

Table 2 shows the difference between the treatments. In no treatment, the mean has 0 and a standard deviation of 0. Commercialized Weed killer has a mean of 4.33 and a standard deviation of 1.53. The coconut sap has a mean of 2 and standard deviation of 1. The Calamansi Extract has a mean of 1.30 and a standard deviation of .577. The Coconut Sap and Calamansi Extract has a mean of 4 and a standard deviation of 2.

Using one-way ANOVA at 0.05 level of significance, the result shows that the f-value of 1.345 > the p-value of .297. this indicates the null hypothesis is rejected, therefore there is a significance between the level of Alternative Weed killer.

CONCLUSION

Based on the gathered data and results, there is a significant difference between the Commercialized Weed Killer and the Alternative Weed Killer. The Alternative Weed Killer has almost the same performance with the Commercialized Weed Killer. In applying the researcher’s weed killer, it consumes three days to be completely wilted, the same with the Commercialized Weed Killer. This implies that commercialized Weed Killer is more effective than the Alternative Weed Killer but the researcher- made weed killer can keep the richness of the soil and non-toxic.

REFERENCES

1. Lovejoy, A. (2016) Vinegar-Based and Citrus-Based Weed Killers. Retrieved from www.finegardening.com/vinegar-based-and-cinrus-based-weed-killers on November 17,2013.
2. McSpadden Gardener, B., Fravel, D. (2002) Biological Control of Plant Pathogens: Research, Commercialization, and Application in the USA. Retrieved from www.apsnet.org/publications/apsnetfeatures/Pages/BioControl.aspx on November 13, 2017.

3. Valicoff, E. (2014). The performance of the citric acid in weeds. Retrieved from www.researchgate.com/almedia/ on November 15, 2017.
4. Webber, C., Shrefler, J., Brandenberger, L., Johnson, C., Davis, A., Taylor, M., Boydston, Rick. (2009) Current Substances for Organic Weed Control in Vegetables or What Do We Have In Our Organic Weed Control Toolbox? Retrieved from: www.researchgate.net/publication/478101108_Current_substances_for_organicweed_control_in_vegetables_or_what_do_we_have_in_our_organic_weed_control_tool_box on November 18, 2017.