International Journal of Natural Science Studies and Development (IJOSS)
Volume 2 Issue 2 2025, pp 171-176
E-ISSN: 2615-1383
DOI: https://doi.org/10.55299/ijoss.v2i2.24

Dormancy Breaking of Soursop (*Annona muricata* L.) Seeds Through Soaking in Onion Extract Hormones

Erna Lydia Wati Zebua[1*], Rasmita Adelina[2*], Muhammad Nizar Hanafiah Nasution[3], Rizky Amnah[4], Sri Winaty Harahap[5], Erin Alawiyah Siregar[6]
[1,2,3,4,5,6] *Agrotechnology, Graha Nusantara University, Padangsidimpuan, Indonesia*
** Corresponding author: rasmita301271@gmail.com*

Abstract

Soursop is a perennial plant that has a hard seed coat that causes the seeds not to germinate immediately. This study aims to determine the effect of soaking shallot extract on soursop seed germination. This study was conducted from January to March 2025 at the Experimental Field of the Faculty of Agriculture, Graha Nusantara University. The research method used was an experimental method using a Randomized Block Design with one factor, namely the concentration of shallot extract hormones consisting of 5 levels, namely: K0 (control), K1 (20% extract), K2 (40% extract), K3 (60% extract), and K4 (80% extract). The observation parameters carried out were the percentage of total growth (%), germination rate, plant length (cm), number of leaves (strands), and root length (cm). The results showed that soaking shallot extract can help in soursop seed germination. The implementation of soaking in 20% extract showed a significantly different effect on plant length, number of leaves and root length.

Keywords: dormancy, soursop seeds, shallot extract, Hormones

1. INTRODUCTION

Soursop (*Annona muricata* L.) is a perennial plant that can bear fruit all year round as long as the water and nutrient conditions it needs are sufficient. This plant originates from North America and then spread to tropical areas, one of which is in Indonesia. Soursop plants have various benefits. Old soursop fruit can be eaten fresh, can also be used as a processed ingredient for dodol, syrup and beauty products and can also be used as a raw material for pharmacology (Sunarjono, 2011).

In general, soursop propagation techniques are carried out through seeds because they will produce plants that have a strong root system and are able to support plant growth well when mature. One of the obstacles in soursop cultivation is that the seeds do not immediately germinate (dormant). This is because soursop seedshas a hard skin that causes the seeds to be impermeable to gas and water which results in inhibited germination or can also be called seed dormancy (Noflindawati, 2014). Therefore, different methods and techniques are needed to overcome this dormancy.

Common treatments for seed coat dormancy include soaking in hot water, mechanical and chemical scarification, and hot air aeration (Olmez, et al., 2007). According to Adelina et. al., (2021), soaking with sulfuric acid can also break the dormancy of kimalaka seeds. The technique for physically breaking dormancy is usually by injuring the tip of the plant seed or commonly called scarification (Aryanto, et al., 2020).). Scarification aims to make the seed coat or seed easier for water to enter during the imbibition process. According to

History:
Received : May 20, 2025
Revised : June 14, 2025
Accepted : July 20, 2025
Published : July 24, 2025

Publisher: Inovasi Pratama Int. Press

Sipahutar, et al. (2023), the treatment of soaking in sulfuric acid (H2SO4) for 30 minutes has a significant effect on the germination of soursop seeds at 81.25%.

In addition, Nurshanti (2009) stated that seed germination and seedling growth can also be influenced by various concentrations of growth regulators, namely the hormone GA3.According to Siregar (2018), 60% concentration of red onion extract (*Allium cepa* L.) with a soaking time of 9 hours can increase the percentage of germination power, growth rate, hypocotyl length and root length of cocoa seeds (*Theobroma cacao* L.). In addition, Faiz (2019) in his research stated that soaking with 50% concentration of red onion extract gave the best results on the vigor of robusta coffee seeds in the parameters of root length (cm), hypocotyl length (cm), average increase in hypocotyl length per week (cm) and time to become kepelan (HSS).
Based on the background above, it is necessary to conduct research to determine the effect of soaking red onion extract on soursop seed germination.

2. RESEARCH METHODS

This research was conducted at the Experimental Land of the Faculty of Agriculture, Graha Nusantara University in January - March 2025 at an altitude of ± 480 meters above sea level. The materials used were soursop seeds of the Ratu variety, shallot bulbs, compost, soil, and distilled water. The tools used were polybags, measuring cups, knives, filter cloths, digital clocks, rulers, paranets, and cameras.
This study was conducted using an experimental method using a non-factorial randomized block design method with one factor, namely the concentration of shallot extract HORMONES, which consists of 5 levels, namely: K0 (control), K1 (20% extract), K2 (40% extract), K3 (60% extract), and K4 (80% extract). The number of replications was 3 replications and the number of seeds was 4 per plot so that the total number of seeds was = 5 x 3 x 4 = 60 seeds. The number of sample plants was 4 per treatment so the total sample was 4 x 5 x 3 = 60 plants.

3. RESULTS AND DISCUSSION

A. Total Percentage Growth

Table 1. Growth Percentage (%)

Treatment	Growth Percentage
Control	100.00
Extract 20%	75.00
Extract 40%	83.33
Extract 60%	50.00
Extract 80%	91.67

Based on Table 1, it shows that the treatment with the best total growth percentage is in the K0 treatment with a growth percentage value of 100%. Then followed by the 20%, 40% and 80% extract treatments with growth percentages of 75%, 83.33% and 91.67% respectively. While the total growth percentage parameter with the lowest value is the 60% extract treatment with a percentage value of 50%.
The results of this study indicate that the treatment of soaking shallot extract has an effect on the percentage of soursop seed growth. This is proven in the 80% extract treatment which has a fairly high total growth percentage of 91.67%. Meanwhile, other treatments

(such as 60% extract) have a low total growth percentage due to the scarification that was not carried out properly, resulting in a low growth percentage. Proper scarification can help the HORMONES used to be optimally absorbed by the seeds, thereby increasing the growth percentage.
According to Sutopo (2012), physical scarification or wounding of the seed coat is a way to change the condition of the seed from impermeable to permeable. Cutting is one of the techniques used for physical scarification of seeds. Added by Hajar (2021) who stated that differences in scarification positions can affect the germination of soursop seeds.

B. Germination Rate

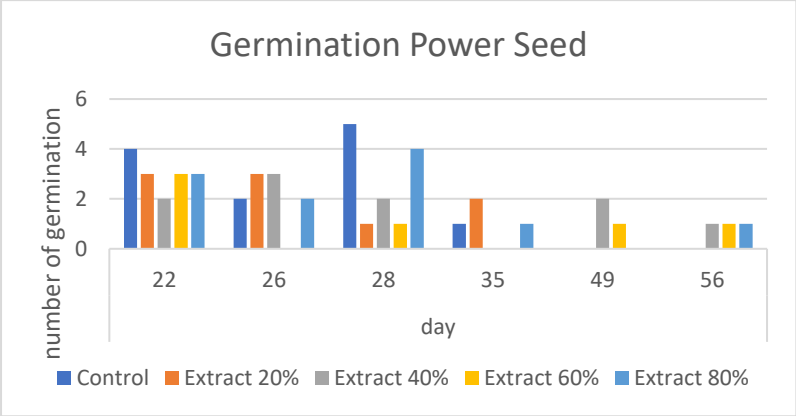

Figure 1. Germination Rate Diagram

Based on Figure 1, it can be seen that soursop seed germination begins at 22 HST and continues until 56 HST. At the age of 22-28 HST, soursop seeds have a fairly high germination rate compared to the age of 35-56 HST which has little germination. This shows that soaking shallot extract hormones can help soursop seeds in accelerating germination. Darojat (2014) stated that soaking hormones in seeds before planting can allow seeds to germinate, thereby increasing the water content of the seeds which then helps stimulate the germination process. Shallot extract is one of the natural hormones that contains auxin and gibberellin hormones that can help accelerate the seed germination process.

C. Plant Length

Table 2. Average Plant Length (cm)

Treatment	Age			
	6 MST	7 MST	8 MST	9 MST
Control	7.75b	8.34b	9.19	9.61
Extract 20%	7.44b	8.03b	8.30	9.09
Extract 40%	5.33ab	7.73b	7.93	8.92
Extract 60%	1.67a	2.07a	4.67	4.84
Extract 80%	7.20b	7.15b	8.18	8.03

Description: Numbers followed by the same letter in the same column indicate no significant difference between treatments (ANOVA with DMRT test at the level ofα= 0.05)

Based on Table 2, it can be seen that the average length of soursop plants increased every week. The control treatment showed the highest average value compared to other treatments. Then followed by 20% extract. The lowest average plant length was seen in

the 60% extract treatment. This is thought to be influenced by the low percentage of total growth. In addition, it can be seen that the 80% extract treatment experienced an increase and decrease in the soursop plant length parameter. This is due to the asynchronous rupture of the cotyledons, which affects the average plant length every week.
From the distribution of the average length of soursop plants from week 6 to week 9, it was concluded that the 20% extract treatment gave a better effect than the 40%, 60% and 80% extracts. While the control and 20% extract treatments showed an average plant length that was almost the same so that there is a possibility that the plant length will be more optimal if the concentration of shallots is lower.
This is also in accordance with the research conducted by Siregar (2015) giving natural HORMONES (Plant Growth Regulator) derived from shallots with concentrations of 1.5% and 2% gave the best growth of gaharu seedlings. Added by Darojat (2014), in his research stated that shallot extract (*Allium cepa* L.) with a concentration of 10% was able to increase the percentage of germination power, growth rate, hypocotyl length and root length of cocoa seeds (*Theobroma cacao* L.).

D. Number of Leaves

The number of soursop seed leaves aged 6-9 MST and its analysis of variance can be seen in Appendices 9-16. Based on observation data and the results of its analysis of variance, it shows that the concentration of shallot extract has a significant effect on the number of leaves at each seed age except at age 6 which can be shown in the following Table:

Table 3. Average Number of Leaves (strands)

Treatment	Age			
	6 MST	7 MST	8 MST	9 MST
Control	2.00	2.50c	2.67c	3.33c
Extract 20%	2.17	2.43c	3.23c	3.07bc
Extract 40%	1.33	1.33b	1.33ab	1.90ab
Extract 60%	.00	.00a	.33a	.67a
Extract 80%	1.00	1.83bc	2.17bc	2.67bc

Description: Numbers followed by the same letter in the same column indicate no significant difference between treatments (ANOVA with DMRT test at the level ofα= 0.05)

Based on Table 3, it can be seen that the average number of plant leaves at each observation age increased. In the 6th and 8th weeks, the 20% extract treatment gave the best effect on the number of plant leaves compared to other treatments. While in the 7th and 9th weeks, the control treatment showed the highest average value with other treatments, but was not significantly different from the 20% and 80% extract treatments. This shows that shallots have content that can help plant growth.
According to Marfirani, et al., (2014) Shallots (*Allium cepa* L.) are horticultural plants that contain growth hormone compounds in the form of auxins and gibberellins, which can increase tissue growth in the process of plant parts, such as leaves, stems, and roots. Positive interactions between exogenous growth regulators added to the media with endogenous growth regulators produced by plant tissue in the process of forming organs such as shoots or roots, so that exogenous administration of growth regulators can increase the concentration of phytohormones in the plant body (Bernula, et al. 2020).

E. Root Length

Based on observation data and analysis of variance testing, it shows that soaking shallots has a significant effect on the length of soursop plant roots. The average length of soursop seed roots can be seen in Table 4 below.

Table 4. Average root length (cm)

Treatment	Root Length
Control	3.73bc
Extract 20%	5.37c
Extract 40%	1.98ab
Extract 60%	.52a
Extract 80%	1.15a

Description: Numbers followed by the same letter in the same column indicate no significant difference between treatments (ANOVA with DMRT test at the level ofα= 0.05)

Based on Table 4, it can be seen that the 60% and 80% extract treatments were significantly different from the control treatment, but very significantly different from the 20% extract treatment which had a value of 5.37 cm. This shows that the 20% extract treatment is able to provide a better effect on root length parameters compared to other treatments. In line with Kira's research (2013) which states that root and shoot growth can also be stimulated by auxin and Vitamin B1 (thiamine). In shallots, every 100 ml of extract contains 10.355 ppm of auxin hormone in the form of IAA (Kurniati, et al., 2017). Continued by Nurlaeni (2015) who stated that giving hormones containing auxin hormone can provide higher growth in the number and length of roots compared to seeds that are not treated with hormones.

4. CONCLUSIONS

Based on the results of the study, it can be concluded that soaking red onion extract can help in the germination of soursop seeds. The treatment of 20% extract showed a significant effect on plant length, number of leaves and root length. This research needs to be further researched with different concentrations of red onion extract to accelerate the breaking of soursop seed dormancy to obtain optimal seed growth.

5. REFERENCES

Adelina, R., Nasution, M. N. H., Harahap, D. E., & Nasution, J. F. (2021). Dormancy Breaking of Kimalaka Seeds (Phyllanthus emblica L.) at Various Concentrations of Sulfuric Acid. In *IOP Conference Series: Materials Science and Engineering* (Vol. 1156, No. 1, p. 012005). IOP Publishing.

Aryanto dan Chuzaemi, S. (2020). *Leguminosa Pohon*. Malang: Media Nusa Creative.

Bernula D, Benkő P, Kaszler N, Domonkos I, Valkai I, & Szőllősi R. 2020. *Timely removal of exogenous cytokinin and the prevention of auxin transport from the shoot to the root affect the regeneration potential of Arabidopsis roots. Plant Cell, Tissue and Organ Culture* (PCTOC), 140(2): 327–339. https://doi.org/10.1007/s11240-019 01730-3

Darojat, M. K., 2014. Pengaruh Konsentrasi dan Lama Perendaman Ekstrak Bawang Merah (*Allium cepa* L.) Terhadap Viabilitas Benih Kakao (*Theobroma cacao* L.). Universitas Islam Negeri Maulana Malik Ibrahim, Malang.

Faiz, C., Sulistyono, N. B. E. 2019. Penggunaan Asam Sulfat dan Ekstrak Bawang Merah Terhadap Uji Vigor Benih Kopi Robusta (*Coffea robusta* L.). Jur. Agriprima 3 (2) : 71-80

Hajar, S. (2021). Pengaruh Perlakuan Skarifikasi dan Konsentrasi Giberelin terhadap Perkecambahan Benih Sirsak (*Annona muricata* L.). Skripsi. Program Sarjana, Universitas Malikussaleh. Aceh Utara.

Kira J. 2013. *Therapeutic benefits of an oral vitamin B1 derivative for human T lymphotropic virus type I-associated myelopathy / tropical spastic paraparesis* (HAM / TSP). BMC Medicine, 11(1): 1. https://doi.org/10.1186/1741-7015 11-183

Kurniati, F., T. Sudartini, dan D. Hidayat. 2017. Aplikasi berbagai bahan zpt alami untuk meningkatkan pertumbuhan bibit kemiri sunan (*Reutealis trisperma* (Blanco) Airy Shaw). J. Agro, 4 (1) : 40 - 49.

Marfirani, M., Y. S. Rahayu, E. Ratnasari. 2014. Pengaruh pemberian berbagai konsentrasi filtrat umbi bawang merah dan Rootone-F terhadap pertumbuhan stek melati rato ebu. Jurnal LenteraBio 3(1): 73–76.

Noflindawati, 2014. Pengaruh Umur Simpan dan Skarifikasi Terhadap Viabilitas Benih Sirsak (*Annona muricata* L.). J. Floratek, 9, 63-68.

Nurlaeni, Yati dan Muhammad Imam Surya.2015. Respon Stek Pucuk Camelia japonica Terhadap Pemberian Zat Pengatur Tumbuh Organik. PROS SEM NAS MASY BIODIV INDON. Volume 1 no 5.

Nurshanti, D.F. 2009. Zat Pengatur Tumbuh Asam Giberelin (GA3) dan Pengaruh Terhadap Perkecambahan Benih Palem Raja (*Roystonea regia*). Agronobis, 1 (2): 71-77.

Olmez, Z., F. Temel., A. Gokturk and Z. Yahyaoglu. 2007. *Effect of Sulphuric Acid and Cold Stratification Pretreatments on Germination of Pomeganate* (*Punica granatum* L). J.Asian Journal of Plant Sciences 6 (2) : 427-430

Sipahutar, A., Adelina, R., dan Harahap, S. W. (2023). Pengaruh Perendaman Asam Sulfat (H_2SO_4) Terhadap Perkecambahan Benih Sirsak *(Annona muricata* L.*)*. Jurnal Agrium, 20 (3) : 204-211

Siregar, A.P., Zuhry E. dan Sampoerno. 2015. Pertumbuhan Bibit Gaharu (*Aquilaria malaccencis*). Dengan Pemberian Zat Pengatur Tumbuh Asal Bawang Merah. Jurnal Vol 2.

Siregar, D. A. (2018). Pemanfaatan Ekstrak Bawang Merah (*Allium cepa* L.) Terhadap Viabilitas Benih Kakao (*Theobroma* kakao L.). *Jurnal Education and development* Institit Pendidikan Tapanuli Selatan, 3 (2) : 23-23

Sunarjono, H. 2011. Sirsak dan Srikaya. Jakarta: Niaga Swadaya

Sutopo, L. 2012. Teknologi Benih. Edisi Revisi. Rajawali Pers. Jakarta.