Journal of Agriculture (JoA)
Volume: 4 | Number 02 | July 2025
E-ISSN: 2829-2421
https://doi.org/10.47709/joa.v4i02.6688

Effect of Golden Snail-Based Local Microorganisms on the Growth and Yield of Baby Corn

Nur Aida Yanti[1], Syaifuddin Anwar[2], Sudirman H[2], Dwi Wahyuni Haswin[1], Muhammad Nasrul[1]
[1]*Faculty of Agriculture and Forestry, Sulawesi Barat University, Indonesia*
[2]*Agricultural Development Polytechnic of Gowa, Indonesia*

Aidayanti1008@gmail.com

Received: 2025-07-27
Accepted: 2025-08-01
Publication: 2025-08-01

Abstract
The use of local microorganisms (MOL) derived from golden apple snails (Pomacea canaliculata) is a sustainable agricultural innovation that supports plant growth through natural bioactivation. Golden apple snails, often considered pests in rice fields, are rich in protein and minerals, making them suitable substrates for microbial development. Fermenting these snails into MOL provides a natural source of beneficial microbes and nutrients that can improve soil health, enhance nutrient availability, and stimulate plant growth. This study aimed to evaluate the effect of different application doses of golden apple snail-based MOL on the growth and yield of semi-corn (Zea mays L.). The field experiment was conducted at Politeknik Pembangunan Pertanian Gowa using a Randomised Complete Block Design (RCBD) with four treatments and three replications. The treatments consisted of P0 = control (without MOL), P1 = 133 ml MOL/plant, P2 = 160 ml MOL/plant, and P3 = 186 ml MOL/plant. The observed parameters were plant height, number of leaves, ear length, and ear weight. The results showed that MOL application significantly affected plant height, ear length, and ear weight. Among the treatments, P2 produced the highest values for all observed parameters, including plant height (160.67 cm), ear length (13.95 cm), and ear weight (60.63 g). Therefore, a dose of 160 ml/plant of golden apple snail-based MOL is considered optimal for improving semi-corn growth and yield under field conditions.

Keywords: Golden Apple Snail; Growth; Local Microorganisms; Spring Corn; Yield

Introduction

Increasing agricultural productivity today is not only demanded in terms of the quantity of crop yields, but also in terms of sustainability and environmental impact. In modern agriculture, environmentally friendly practices have become an important approach to maintaining ecosystem balance and ensuring long-term productivity. These systems emphasize the efficient use of local resources, reduction of chemical emissions, and protection of soil and water quality (Harahap & Siregar, 2019; Utami & Rochana, 2022).

One tangible effort to support sustainable agriculture is reducing the use of chemical fertilizers and switching to natural alternatives. Long-term and excessive use of chemical fertilizers has been proven to reduce soil fertility, contaminate groundwater, and decrease soil microbial biodiversity (Darmawan, 2020). Therefore, utilizing local organic materials as alternative fertilizers is a relevant focus for the development of environmentally friendly agriculture.

This is an Creative Commons License This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Journal of Agriculture (JoA)
Volume: 4 | Number 02 | July 2025
E-ISSN: 2829-2421
https://doi.org/10.47709/joa.v4i02.6688

An innovation in this field is the use of Local Microorganisms (MOL), which are fermented solutions made from organic matter containing functional microbes. MOL can be prepared by farmers using readily available materials such as household waste, agricultural residues, and high-nutrient organisms or pests. It acts as a bioactivator that enhances decomposition processes, enriches soil microbial life, and increases nutrient uptake efficiency in plants (Maulida & Hanafiah, 2023; Lestari, 2025).

One promising material for MOL production is the golden apple snail (*Pomacea canaliculata*), a pest often found in rice fields. Despite being a pest, the golden snail contains high levels of protein and minerals that are beneficial as microbial substrates (Priyono & Hidayat, 2024). Previous studies have shown that animal-based MOL, including those made from golden snails, can enhance microbial activity in soil, improve soil structure, and supply essential macro- and micronutrients (Mulyani, Wahyuni, & Prasetyo, 2020; Sari, Ahmad, & Santoso, 2020).

Spring corn (*Zea mays* L.), also known as baby corn, is a high-value horticultural crop harvested during its early vegetative stage before pollination. This crop requires rapid and optimal vegetative growth in a short time, which demands quick and efficient nutrient availability. The application of MOL through soil drenching is expected to accelerate nutrient absorption and promote early plant growth (Fitriani & Jannah, 2020; Setiawan & Anggraini, 2021).

Although research on MOL using various materials has been widely conducted, the use of golden snail-based MOL remains relatively new and has not been widely applied, particularly on spring corn. Therefore, this study aimed to determine the effect of different doses of golden snail-based MOL on the growth and yield of spring corn, and to identify the optimal dose that can be recommended to farmers as an effective, environmentally friendly, and locally-based organic liquid fertilizer (Ahmad, 2018; Dewi & Rudianto, 2019; Yusuf, 2023).

Literature Review

Sustainable Agriculture and the Role of Organic Fertilizers

The concept of sustainable agriculture emphasizes the use of environmentally friendly inputs that do not harm the ecosystem. Excessive use of chemical fertilizers has been linked to environmental degradation, reduced soil health, and contamination of water sources (Darmawan, 2020). Therefore, researchers and practitioners have shifted focus toward alternative inputs such as organic fertilizers that can enhance soil microbial diversity and nutrient cycling (Harahap & Siregar, 2019).

Local Microorganisms (MOL) as a Biofertilizer

Local Microorganisms (MOL) are bioactivators made from naturally available materials like kitchen waste, animal waste, and weeds. MOL contains beneficial microbes such as *Lactobacillus spp.*, *Saccharomyces spp.*, and photosynthetic bacteria, which help improve soil fertility and stimulate plant growth (Maulida & Hanafiah, 2023). When applied to the soil, MOL increases the population of decomposers and promotes nutrient availability (Utami & Rochana, 2022).

Golden Snail (*Pomacea canaliculata*) as MOL Material

Golden snail, typically considered an agricultural pest, is increasingly recognized for its high protein and nitrogen content, making it a valuable resource for MOL production (Priyono & Hidayat, 2024). The fermentation of golden snail produces a solution rich in amino acids and minerals that enhance root development, vegetative growth, and soil microbial activity (Mulyani, Wahyuni, & Prasetyo, 2020). Studies also reported that golden snail-based MOL improved plant

This is an Creative Commons License This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Journal of Agriculture (JoA)
Volume: 4 | Number 02 | July 2025
E-ISSN: 2829-2421
https://doi.org/10.47709/joa.v4i02.6688

height, leaf number, and biomass accumulation in crops like chili and maize (Sari, Ahmad, & Santoso, 2020).

Application of MOL in Corn Production

Corn (*Zea mays* L.), including baby corn, is sensitive to early nutrient availability, especially during its short vegetative phase. Application of MOL can fulfill nutrient demands more quickly than traditional composts due to its liquid form and microbial content (Fitriani & Jannah, 2020). According to Setiawan and Anggraini (2021), MOL application improved the growth and yield components of corn by promoting faster root establishment and better nutrient uptake.

Research Method

The implementation of research on the application of local microorganisms to the growth and production of semi corn plants uses the Randomized Group Design (RAK) method consisting of four treatments and three replications so that there are 12 experimental plots. The doses of the treatments are as follows: P0= No treatment/as control , P1= 133 ml MOL/ plant, P2= 160 ml MOL /plant, P3= 186 ml MOL/plant

The observation parameters carried out in the study activities are by direct measurement on the study field. Plant samples that were observed amounted to 6 samples of 27 plants in one plot obtained by randomizing the plants with measurement time intervals of 2, 4, 6 weeks after planting and carried out until entering the generative phase of the plant.

Results and Discussion

The results of the study on the application of local microorganisms to the semi corn plant, then observations were made on plant height, number of leaves, cob length and cob weight of semi corn.

Plant height

Table 1. Average growth of plant height (cm) at the age of 2-6 weeks after planting (MST)

Treatment	Plant height (cm)		
	2	4	6
P0	21.10 a	61.13 a	108.50 a
P1	29.06 b	75.57 b	127.17 a
P2	30.97 b	95.33 b	160.67 b
P3	30.33 b	90.70 b	146.83 b
KK	7.34	11.46	11.46
BNT 0.05	4.28	11.30	23.95

This is an Creative Commons License This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Journal of Agriculture (JoA)
Volume: 4 | Number 02 | July 2025
E-ISSN: 2829-2421
https://doi.org/10.47709/joa.v4i02.6688

Notes: The numbers in the same column, followed by the same letter means not significantly different at the BNT 0.05 test level.

The results showed that treatment P2 (160 ml MOL/plant) gave the highest plant height significantly compared to other treatments. This indicates that this dose provides the ideal amount of microorganisms and nutrients to stimulate optimal plant growth. Keong mas contains nitrogen (N), phosphorus (P), and potassium (K) elements needed by plants during the vegetative growth phase. In addition, the fermentation process in MOL produces growth hormones such as auxins, gibberellins, and cytokinins that stimulate cell elongation (Utami & Rochana, 2022).

At low doses (P1), the provision of MOL has not been able to meet the nutrient needs of plants, while at high doses (P3), excess nutrients and microbial activity can cause biological imbalances around the roots that actually inhibit growth. This is in accordance with the findings of Fitriani and Jannah (2020) who stated that the efficiency of MOL is highly dependent on the dose and frequency of application

Number of leaves

Table 2. Number of Plant Leaves (Helai) at the Age of 2-6 MST

Treatment	Number of leaves		
	2	4	6
P0	3.93	7.13	6.3
P1	4.60	7.83	7.40
P2	4.70	7.90	8.60
P3	4.67	7.87	8.23
KK	1.46 tn	2.67 tn	1.38 tn

Notes: The numbers in the same column, followed by the same letter mean not significantly different at the BNT 0.05 test level.

The number of leaves is an important indicator of vegetative growth because it is related to the photosynthetic surface area. The increase in the number of leaves in the P2 treatment indicates that MOL keong mas plays a role in stimulating the growth of new tissues. The cytokinin hormone formed during fermentation plays a role in cell division and the formation of leaf buds. Microbial activity in MOL also increases the mineralization of organic matter so that nutrients become more available to plants (Harahap & Siregar, 2019).

The number of leaves in the P3 treatment did increase compared to the control, but not significantly compared to P2, which strengthens the assumption that the optimal dose to support leaf development is at 160 ml/plant.

Length of cob

Table 3. Length of Cobs of Harvested Plants at the Age of 56 HST

Treatment	Value (cm)

This is an Creative Commons License This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Journal of Agriculture (JoA)
Volume: 4 | Number 02 | July 2025
E-ISSN: 2829-2421
https://doi.org/10.47709/joa.v4i02.6688

P0 Control	11.46 a
P1 133 ml MOL/plant	12.50 a
P2 160 ml MOL /plant	13.95 b
P3 186 ml MOL /plant	13.52 b
KK	6.68
BNT 0.01	1.28

Notes: The numbers in the same column, followed by the same letter means not significantly different at the BNT 0.01 test level.

Cob Weight

Table 4. Weight of Semi Harvested Corn Cobs at Age 56 HST

Treatment	Value (gr)
P0 Control	32.60 a
P1 133 ml MOL/plant	43.07 a
P2 160 ml MOL /plant	60.63 b
P3 186 ml MOL/plant	51.87 b
KK	20.136
BNT 0.05	14.86

Notes: The numbers in the same column, followed by the same letter mean not significantly different at the BNT 0.01 test level.

Plant generative growth is strongly influenced by the availability of nutrients during the early phase of growth. The results showed that the P2 treatment produced longer and heavier cobs than the other treatments. This indicates that the application of MOL at the optimal dose increases the yield quantitatively.

The length and weight of the cob are largely determined by the speed of seed formation and filling, which is directly related to the availability of energy from photosynthesis. The increase in the number of leaves and plant height previously supported the photosynthetic surface area, thus supporting yield formation. In addition, MOL improves the activity of soil microbes such as Azotobacter and Pseudomonas which play a role in free N fixation and P solubilization (Priyono & Hidayat, 2024).

The P3 treatment did not show a significant increase in yield compared to P2. This is likely due to excess doses that are not absorbed efficiently and can actually disrupt the natural soil microflora.

This is an Creative Commons License This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Journal of Agriculture (JoA)
Volume: 4 | Number 02 | July 2025
E-ISSN: 2829-2421
https://doi.org/10.47709/joa.v4i02.6688

Conclusion

This study demonstrated that the application of gold snail-based Local Microorganisms (MOL) significantly influenced the growth and yield of spring corn (*Zea mays* L.). Among the four treatment doses evaluated, the application of 160 ml/plant (P2) produced the most favorable results across all observed parameters: plant height (160.67 cm), number of leaves (8.60), cob length (13.95 cm), and cob weight (60.63 g). These findings suggest that the 160 ml/plant dose represents the optimal level to promote vegetative growth and achieve maximum yield formation in spring corn cultivation .

The benefit of this research for scientific knowledge lies in its contribution to the development of sustainable agricultural practices by utilizing locally available natural resources**.** The use of gold snail-based MOL offers an environmentally friendly alternative to chemical fertilizers, enriching the scientific understanding of organic input potentials in crop production systems, particularly for enhancing growth and productivity in maize.

References

Ahmad, Z. (2018). Study of gold snail-based MOL in tidal land. *Pontianak Agro Journal*, *6*(1), 65–72.

Darmawan, F. (2020). MOL as a source of plant micronutrients. *Journal of Soil and Environmental Sciences*, *22*(2), 103–110.

Dewi, K. A., & Rudianto, R. (2019). Effects of MOL on sweet corn growth. *Journal of Innovative Agro*, *3*(2), 75–82.

Fitriani, R., & Jannah, S. (2020). The advantages of animal-based MOL. *Journal of Agricultural Development*, *6*(1), 91–98.

Harahap, S. R., & Siregar, M. A. (2019). Utilization of MOL in sustainable agriculture. *Journal of Tropical Agroecotechnology*, *7*(2), 122–130.

Lestari, S. (2025). Optimizing the use of local organisms in agricultural production. *Journal of Agricultural Science and Technology*, *10*(1), 10–16.

Maulida, M. R., & Hanafiah, J. (2023). Organic waste-based local microorganisms. *Journal of Sustainable Agriculture*, *8*(3), 123–130.

Mulyani, R., Wahyuni, S., & Prasetyo, B. (2020). Effectiveness of animal-based MOL on corn growth. *Journal of Integrated Agriculture*, *3*(1), 45–52.

Nugroho, A., Wibowo, H., & Lestari, D. (2021). The role of MOL keong mas in increasing the yield of horticultural crops. *Agro Lestari*, *9*(1), 11–18.

Priyono, A., & Hidayat, Y. (2024). Evaluation of the utilization of gold snail waste as liquid fertilizer. *Journal of Agricultural Environmental Technology*, *14*(1), 19–27.

Sari, D. A., Ahmad, M., & Santoso, H. (2020). Potential of gold snail as MOL material. *Journal of Environmentally Friendly Agriculture*, *5*(2), 77–83.

Setiawan, T., & Anggraini, N. (2021). Effectiveness of MOL in supporting local POC. *Agritech Journal*, *15*(4), 223–230.

This is an Creative Commons License This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License

Journal of Agriculture (JoA)
Volume: 4 | Number 02 | July 2025
E-ISSN: 2829-2421
https://doi.org/10.47709/joa.v4i02.6688

Utami, P. W., & Rochana, H. (2022). MOL as a substitute for chemical fertilizers. *Journal of Agricultural Biotechnology*, *10*(1), 89–97.

Wulandari, E., Syamsuddin, A., & Andriani, D. (2019). Effect of MOL on corn plant growth. *Indonesian Journal of Agrotechnology*, *8*(3), 201–208.

Yusuf, A. (2023). Utilization of gold snail for locally based MOL. *Journal of Agricultural Innovation*, *11*(1), 35–42.

This is an Creative Commons License This work is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License