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# Effectiveness of Nionvera: A Natural Rooting Hormone Derived from Red Onion and Aloe Vera on the Root Development of Aglaonema Cuttings

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**Abstract:** This study evaluated the effectiveness of a natural rooting hormone named Nionvera, formulated from red onion (*Allium cepa*) and aloe vera (*Aloe vera*), on the root development of Aglaonema cuttings. Three concentrations of Nionvera were tested and compared with a water-only control. The experiment was conducted over an 8-week period at the Horticulture Unit of Kolej Vokasional Pertanian Teluk Intan, with 15 Aglaonema plants divided equally across the treatments. Parameters measured included the number of shoots and leaves. Results showed that the third concentration (500 g red onion + 500 g aloe vera + 100 mL water) significantly promoted root and shoot development compared to other treatments. The findings suggest that Nionvera is a promising low-cost, eco-friendly alternative to synthetic rooting hormones.

**Keywords:** Natural rooting hormone, Aglaonema, Nionvera, red onion, aloe vera, root development

## 1. Introduction

The use of rooting hormones is a common practice in horticultural propagation, particularly for plants that are propagated vegetatively through cuttings. Rooting hormones promote root initiation and development, thereby increasing propagation success rates and ensuring healthy plant establishment. Synthetic hormones such as indole-3-butyric acid (IBA) and naphthalene acetic acid (NAA) are widely used commercially due to their proven effectiveness in stimulating root formation (Ali et al., 2021). However, there is increasing concern over the environmental safety, cost, and accessibility of synthetic rooting agents, especially for small-scale and home gardeners. This has prompted research into natural alternatives derived from plant-based materials.

Among the potential sources of natural rooting hormones, red onion (*Allium* cepa) has received attention due to its bioactive compounds, including thiamine (Vitamin B1), allicin, and endogenous auxins such as indole-3-acetic acid (IAA). These compounds are known to influence cell division, elongation, and root induction in various plant species (Lawalata, 2011; Nofrizal, 2007). Furthermore, red onion extract has demonstrated promising results in enhancing seed germination and early root development (Darojat et al., 2015). The outer scales and shoots of onions are particularly rich in these phytochemicals, which can function as natural plant growth regulators when appropriately extracted and applied.

Aloe vera (*Aloe vera* L. Burm.f.) is another widely available plant with well-documented benefits for plant growth. The gel inside its succulent leaves contains auxins, gibberellins, vitamins, enzymes, amino acids, and polysaccharides, which together contribute to enhanced cell proliferation, elongation, and stress resistance in plants (Primasari, 2019; Sundahri, 1994). Studies have shown that aloe vera gel can significantly increase root length and biomass in stem cuttings of ornamental and medicinal plants (Sumantra, 2002). Its anti-microbial and antioxidant properties also help reduce the risk of pathogen attack during the early stages of propagation.

Aglaonema, commonly known as Chinese evergreen, is a popular ornamental foliage plant prized for its aesthetic value and adaptability to low-light conditions. Due to its high market demand and decorative appeal, it is often propagated through stem cuttings. However, successful propagation requires optimal rooting conditions and, ideally, the application of rooting hormones. Given the limitations of synthetic options and the promising qualities of red onion and aloe vera, formulating a natural rooting hormone using these components may provide an effective and environmentally friendly solution for Aglaonema propagation.

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This study introduces "Nionvera," a homemade rooting hormone formulated from red onion and aloe vera, aimed at enhancing the root development of Aglaonema stem cuttings. The objective was to evaluate the efficacy of three different concentrations of Nionvera in promoting the emergence of new shoots and leaves, compared to a control treatment. This research contributes to the growing body of sustainable horticultural practices by offering an alternative propagation method that is accessible, cost-effective, and eco-friendly.

## 2. Materials and Methods

### 2.1 Study Site and Experimental Design

The experiment was conducted at the Horticulture Unit, Kolej Vokasional Pertanian Teluk Intan, Malaysia, from September to November 2023. A total of 15 *Aglaonema* cuttings were used and divided into four groups: three Nionvera treatments (C1, C2, C3) and a control group treated with plain water.

### 2.2 Nionvera Preparation

Three concentrations of Nionvera were prepared as follows:

- C1: 100 g red onion + 100 g aloe vera + 100 mL water
- C2: 300 g red onion + 300 g aloe vera + 100 mL water
- C3: 500 g red onion + 500 g aloe vera + 100 mL water

The ingredients were blended, filtered, and stored refrigerated before use.

### 2.3 Planting Procedure

*Aglaonema* cuttings were soaked in the respective formulations for 10 minutes before planting in a prepared potting mix (topsoil, organic compost, and sand in a 3:2:1 ratio). The pots were arranged in a nursery under controlled watering (twice daily) and monitored for weed and pest management.

### 2.4 Data Collection

Observations were made weekly for 8 weeks. Data were collected on two parameters which is the number of new shoots and the number of new leaves.

### 2.5 Statistical Analysis

Mean values of each parameter were calculated and compared across treatments to determine the effectiveness of each concentration.

## 3. Results

The effectiveness of Nionvera as a natural rooting hormone was evaluated based on two parameters: the number of new shoots and the number of new leaves developed on *Aglaonema* cuttings over an 8-week period (Figure 1). Three concentrations of Nionvera (C1, C2, and C3) were compared against a control (plain water). Each treatment was applied to five *Aglaonema* cuttings, and data were recorded weekly.

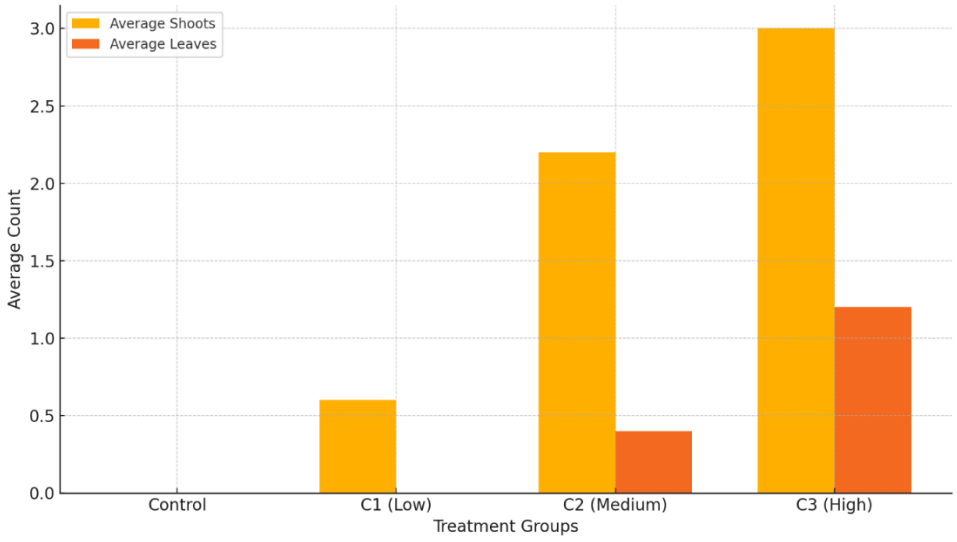

**Fig. 1: Average number of shoots and leaves on *Aglaonema* cuttings after 8 weeks under different Nionvera concentrations.**

## 3.1 Concentration 1 (C1: 100 g red onion + 100 g aloe vera + 100 mL water)

The first formulation (C1) showed minimal growth response. Over the 8-week period, only three out of the five plants developed a single shoot each, and none produced any new leaves. Notably, the shoot development occurred sporadically and slowly, with no visible activity during weeks 3 to 8. The average number of shoots was 0.6, and the average number of leaves remained at 0. This suggests that the low concentration of bioactive compounds in C1 was insufficient to induce significant rooting or vegetative growth. The lack of nutrient density in this treatment may have limited the ability of the plant tissues to initiate active cell division or elongation.

## 3.2 Concentration 2 (C2: 300 g red onion + 300 g aloe vera + 100 mL water)

A marked improvement in growth was observed with the second formulation (C2). The shoot formation was more consistent and prominent compared to C1, with an average of 2.2 shoots and 0.4 leaves per plant. In particular, one plant (P2) developed nine shoots, while others showed moderate activity. Leaf emergence, although limited, was more evident in C2 than C1. The enhanced performance at this concentration can be attributed to the higher content of auxin, thiamine, and other growth-stimulating compounds present in the red onion and aloe vera blend. These bioactive substances likely stimulated cell proliferation in the stem cuttings, resulting in greater shoot and leaf development.

## 3.3 Concentration 3 (C3: 500 g red onion + 500 g aloe vera + 100 mL water)

The third formulation (C3) yielded the most successful results. All five plants exhibited vigorous shoot development, with an average of 3 shoots and 1.2 leaves per plant by the end of week 8. The shoot and leaf emergence began earlier and progressed more rapidly compared to other treatments. In some cases, shoot initiation began as early as the second week. The significantly better performance of C3 suggests a dose-dependent response, where higher concentrations of natural hormones and nutrients effectively promoted rooting and vegetative growth. The combination of auxin from red onion and gibberellin-like compounds from aloe vera likely acted synergistically to enhance root formation, which supported the upward development of shoots and foliage.

## 3.4 Control (Water only)

In contrast, the control group, which was treated with plain water, did not exhibit any observable growth in terms of shoots or leaves during the entire experimental period. This outcome reinforces the importance of applying exogenous plant growth stimulants for successful propagation, particularly in vegetative cuttings such as *Aglaonema*, which often require hormonal cues for effective root and shoot initiation.

A comparative summary of all treatments revealed a clear trend: higher concentrations of Nionvera resulted in greater shoot and leaf production. As shown in Figure 1, C3 produced the highest average shoot and leaf numbers, followed by C2 and C1. The control treatment remained ineffective. This trend suggests a positive correlation between the concentration of the natural hormone and the vigor of plant growth.

## 4. Discussion

The results of this study strongly indicate that Nionvera, a natural rooting hormone composed of red onion and aloe vera, positively influences the vegetative propagation of *Aglaonema*. A clear dose-dependent response was observed, where increasing concentrations of Nionvera enhanced the development of new shoots and leaves. This supports the hypothesis that bioactive compounds in these natural ingredients promote root and shoot formation in stem cuttings.

The success of the highest concentration (C3) can be attributed to the abundant presence of natural auxins, vitamins (such as B1), amino acids, and other phytohormones. Red onion, as reported by Lawalata (2011) and Nofrizal (2007), contains indole-3-acetic acid (IAA) and allicin, both known to facilitate root development and cell elongation. Aloe vera complements this with its own auxins and gibberellins, which regulate cell division and shoot initiation (Primasari, 2019; Sumantra, 2002). The synergistic effect of these compounds at higher concentrations likely enhanced root meristem activity, leading to better nutrient uptake and shoot formation.

The moderate performance of C2 also affirms the effectiveness of Nionvera, though with slightly lower shoot and leaf production. It suggests that a mid-level concentration is sufficient to stimulate noticeable growth in *Aglaonema*, aligning with previous studies that have found 30–50% plant-based hormone extracts to be optimal for rooting purposes (Darojat et al., 2015; Sundahri, 1994). This is important for practical applications, especially for small-scale users who may prioritize resource efficiency without compromising effectiveness.

On the other hand, the limited response observed in C1 may reflect suboptimal levels of active compounds. Insufficient hormone availability at this low concentration possibly resulted in delayed or reduced signaling for adventitious root and shoot development. According to Salisbury and Ross (1995), hormone concentrations below physiological thresholds may fail to initiate metabolic cascades necessary for organogenesis in plant tissues. This underlines the importance of concentration calibration when preparing homemade rooting solutions.

The absence of growth in the control group emphasizes the necessity of exogenous hormone application in facilitating propagation through stem cuttings, especially for semi-herbaceous ornamentals like *Aglaonema*. In the absence of stimulating agents, the cuttings likely experienced hormonal imbalance or failed to overcome natural dormancy in meristematic tissues. These findings resonate with previous research on *Aglaonema* and similar species, where external inputs such as auxins or organic stimulants significantly enhanced propagation success rates (Purwanto, 2006; Nor Murni, 2021).

Some challenges were also noted during the trial. Three plant deaths were recorded, particularly in areas exposed to direct sunlight and heavy rainfall. Overexposure to environmental stress, such as waterlogging, may have compromised root oxygenation and increased susceptibility to pathogens. As highlighted by Choudhury et al. (2021), optimal environmental control is crucial during early rooting stages, especially when using organic treatments that may degrade under fluctuating moisture and light conditions.

Overall, the results of this study support the viability of Nionvera as a sustainable alternative to commercial rooting hormones. Its formulation is simple, accessible, and environmentally friendly. Moreover, its success opens the door for further exploration into other natural plant extracts with growth-promoting properties. Future studies should consider extending the trial to different ornamental or horticultural species and testing the biochemical composition of the extract to better understand its mechanism of action.

## 5. Conclusion

This study demonstrates that Nionvera, a natural rooting hormone derived from red onion (*Allium cepa*) and aloe vera (*Aloe vera*), significantly enhances the root and shoot development of *Aglaonema* cuttings, with the highest concentration (500 g each of red onion and aloe vera per 100 mL water) showing the most pronounced results. The positive dose-response relationship observed confirms the effectiveness of these plant-based ingredients as organic growth stimulants, offering a cost-effective, environmentally friendly alternative to synthetic rooting hormones. These findings provide a practical solution for home gardeners and small-scale horticulturists while contributing to sustainable propagation practices.

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**Conflict of Interest**

The authors declare no conflicts of interest.

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