The Effect of Salic Acid (SA) on the Growth of Alugbati

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ABSTRACT:
This study, conducted from July 9, 2024, to August 16, 2024, at Upper San Raymundo, Shiek Mustafa Compound, Jolo, Sulu, investigated the effect of salicylic acid (SA) on the growth of Alugbati (Basella rubra Linn.). The experiment employed a completely randomized design (CRD) with two treatments replicated four times. Treatment 1 served as the control without hormone application, while Treatment 2 was treated via foliar application at a concentration of 10 mL Salicylic acid per liter of water. Results measured over 30 days showed that Treatment 1 (Control) obtained a higher mean height of 88.75 cm, whereas Treatment 2 yielded a mean height of 59 cm. Analysis of variance (ANOVA) revealed a computed F-value of 0.11, which is less than the 1% and 5% tabular levels of significance, indicating that there was no statistically significant difference in plant height between the control and the salicylic acid-treated plants. Consequently, the study concludes that Alugbati can successfully survive and grow without the application of growth-regulating hormones.

Keywords: Alugbati (Basella rubra Linn.), Salicylic Acid (SA), Plant Growth Regulators (PGRs), Completely Randomized Design (CRD), Plant Growth and Development

Introduction

Nature and Importance of the Study

Flour prepared from leaves of Alugbati (Basella rubra) was investigated for functional properties to evaluate its possible application in food products. The plant is a readily available food source and grows in all kinds of soil. The leaves are rich in ascorbic acid and minerals like potassium and calcium. They have also been found to contain significantly high levels of glucosinolates, sulfur - containing secondary metabolites that are precursors to biologically active products that have the potential to inhibit, block and prevent the proliferation of cancer cells (Garza and Talento, 2011). The solubility, water – absorption, swelling, foaming, emulsification, gel formation, fat absorption capacities, and bulk density of Alugbati flour were compared with those of wheat flour Salicylic acid was effective in reducing the drought-induced accumulation of glucosinolates and erucic acid in canola oil. It is inferred that SA is an economical and environmentally friendly alternative and can be implicated to improve the plant growth and oil quality of B. napus in the current scenario of drought and climate change. Besides, Latif et al. (2016) studied the effects of salicylic acid on growth and phenolic accumulation in Zea mays L. under drought stress. The effects of PGRs also have been studied in plant abiotic stress. In this sense, Ullah et al. (2012) showed the effects of PGRs (as SA and Put) on growth and oil quality of canola (Brassica napus L.) under drought stress. Growth regulators were highly effective in ameliorating the adverse effects of drought stress

on both cultivars. The applied growth regulators maintained the water budget of canola plants, augmented the accumulation of osmolyte proline, and protected photosynthetic pigments from the adverse effects of drought stress.

Significant progress has been made in identifying the key components and understanding the role of salicylic acid (SA), jasmonates (JA) and ethylene (ET) in plant responses to biotic stresses. Some studies indicate that other hormones such as abscisic acid (ABA), auxin, gibberellic acid (GA3), cytokinin (CK), brassinosteroids (BR) and peptide hormones are also implicated in plant defence signaling pathways (Bari and Jones, 2009). Growth-regulating substances, plant hormones, or simply phytohormones are compounds produced naturally by plants that participate in the control of plant growth, and they are versatile chemical regulators of plant growth. When these substances are produced synthetically, they are called plant growth regulators (PGRs) (Santner et al., 2009; Davies, 2010; Rademacher, 2015). Plant growth and development require the integration of a variety of environmental and endogenous signals that, together with the intrinsic genetic program, determine plant form. Central to this process are plant growth regulators. The principal phytohormone and/ or PGRs include classical groups or others compounds. Among them are mentioned indol3-ylacetic acid (IAA), indol-3-ylbutyric acid (IBA), 2,4-dichlorophenoxyacetic acid (2,4-D), 1-naphthylacetic acid (NAA), 6-benzylaminopurine (BAP), benzyladenine (BA), gibberellic acid (GA3), ethylene or ethephon (CEPA), abscisic acid (ABA), jasmonate (JA, or yet, methyl jasmonates-MeJA), Chlormequat chloride (CCC), as well as brassinosteroids (BR), salicylic acid (SA), nitric oxide (NO), strigolactone (SL), and polyamines (like putrescine (Put), spermidine and spermine). Besides, other molecules such as ascorbic acid (VC), alpha tocopherol (VE), thidiazuron (TDZ), phenylureas (CPPU), and triazoles (TR). In addition, Karrikins, the new family of plant growth regulators found in smoke (Chiwocha et al., 2009; Davies, 2010; Ullah et al., 2012; Rademacher, 2015; Fahad et al., 2016). The nature, occurrence, transport and effects of each PGRs are different according to their characteristics the risk of lodging in field crops, breaking of bud dormancy, control of fruit set, improvement of fruit quality, acceleration or delay of fruit ripening for optimal harvesting, optimization of fruit storage and ripening, improved morphological structure, increases in yield, and modification of plant constituents (Alcázar et al., 2010; Choudhury et al., 2013; Rademacher, 2015; Fahad et al., 2016; Bergstrand, 2017). PLANT GROWTH REGULATORS Since 1930, PGRs have been a systematic use in different agriculture practices. For instance, control of vegetative growth, decreased susceptibility towards biotic and abiotic stress, reduce

OBJECTIVES

A. Determine the effect of Salicylic acid on the growth of Alugbati

TIME AND PLACE OF THE STUDY

A study was conducted at Upper San Raymundo, Shiek Mustafa Compound, Jolo, Sulu from July 9, 2024, to August 16, 2024.

REVIEW OF RELATED LITERATURE

Importance and Botanical Description

According to Sara Ipotenco, state that Alugbati is a common vegetable in the Philippines, and it's also known as Malabar spinach, though it isn’t spinach at all. The vegetable has heart-shaped leaves that grow along a vivid red stem. The Alugbati plant bears fruit that ranges in color from dark green to red. Alugbati, though it's not spinach, can be used as a substitute for spinach in salad and other recipes. If you opt to expand your place and give Alugbati try, you’ll get a wealth of nutrients, as well as a few health benefits, according to Cagayan de oro about year 2013, illustrate the stems are green or purplish. The leaves are somewhat fleshy, ovate or heart-shaped, 01-06 cm in length, stalked, tapering to appointed tip and heart-shaped at the base. The spikes are axillary, solitary, and 01-06 cm in length. The flowers are pink and about 4mm. long. Noted by Cagayan de Oro about a year 2013, emphasize that the Alugbati is commonly

grown for its young shoots, which make an excellent succulent, slightly mucilaginous vegetable, used as a pot herb in stews or soup; consumed boiled, fried in oil, or sometimes as a green salad. Its fruit seems to have been earlier used for dyeing purposes in China. The red fruit juice can be used as ink, a cosmetic, and for coloring foods. The pulped leaves to poultice sores, the red fruit juice as eye drops to treat conjunctivitis, and the roots as a rubefacient. The red forms are commonly planted as ornamentals and are even becoming popular in Europe as a pot plant. State by natural care, around 2007, reveals that it's good for health and works as a soft laxative. The roots are quite effective in removing redness of the skin. It has been used in dressings to cover the swollen area and minimize puffiness. In case of burns and scalds, apply the mixture of leaf pulp and butter on the wound. It produces a cooling effect. The liquid of the plant is effective for acne eruptions and also eases inflammation. For children and pregnant ladies, the decoction of the leaves makes a better laxative. Proposed by DR. Aligui around the year 2007, explains that Alugbati is an excellent source of antioxidant good source of vitamin A,b, and C, calcium, and iron. also, a good source of roughage. Remarks by Marvin about the year 2011 suggest that Alugbati is a good source of essential nutrients. Excellent source of calcium, iron, vitamin A, vitamin C, Vitamin B.

Significant progress has been made in identifying the key components and understanding the role of salicylic acid (SA), jasmonates (JA) and ethylene (ET) in plant responses to biotic stresses. Some studies indicate that other hormones such as abscisic acid (ABA), auxin, gibberellic acid (GA3), cytokinin (CK), brassinosteroids (BR) and peptide hormones are also implicated in plant defence signaling pathways (Bari and Jones, 2009).

The effect of different plant growth regulators (30 mg l-1 of NAA, 30 mg l-1 of GA3 and 30 mg l -1 of 2,4-D) on growth and yield of tomato (Solanum lycopersicum L.) was studied by Uddain et al. (2009). The maximum plant height at 15 days after transplanting - DAT (33.41 cm), 30 DAT (59.07 cm) and 45 DAT (76.36 cm), number of leaves plant at 15 DAT (15.08), 30 DAT (47.20) and 45 DAT (72.86), number of branches plant at 15 DAT (8.06), 30 DAT (12.13) and 45 DAT (17.85), number of flowers cluster (5.81), number of flower cluster plant (8.83), number of flowers plant (59.62), number of fruits cluster (4.81), number of fruits plant (42.66), average weight of individual fruit (92.06 g), yield plant (2.49 kg) and yield hectare (93.23 t ha-1) were found in plant growth regulators and the minimum for all the parameters were found in control.

Growth regulating substances, plant hormones or simply phytohormone are compounds produced naturally by plants that participate in the control of plant growth, and they are versatile chemical regulators of plant growth. When these substances are produced synthetically, they are called plant growth regulators (PGRs) (Santner et al., 2009; Davies, 2010; Rademacher, 2015). Plant growth and development require the integration of a variety of environmental and endogenous signals that, together with the intrinsic genetic program, determine plant form. Central to this process are plant growth regulators. The principal phytohormone and/ or PGRs include classical groups or other compounds. Among them are mentioned indol3-ylacetic acid (IAA), indol-3-ylbutyric acid (IBA), 2,4-dichlorophenoxyacetic acid (2,4-D), 1-naphthylacetic acid (NAA), 6-benzylaminopurine (BAP), benzyladenine (BA), gibberellic acid (GA3), ethylene or ethephon (CEPA), abscisic acid (ABA), jasmonate (JA, or yet, methyl jasmonates-MeJA), Chlormequat chloride (CCC), as well as brassinosteroids (BR), salicylic acid (SA), nitric oxide (NO), strigolactone (SL), and polyamines (like putrescine (Put), spermidine and spermine). Besides, other molecules such as ascorbic acid (VC), alpha tocopherol (VE), thidiazuron (TDZ), phenylureas (CPPU), and triazoles (TR). In addition, Karrikins, the new family of plant growth regulators found in smoke (Chiwocha et al., 2009; Davies, 2010; Ullah et al., 2012; Rademacher, 2015; Fahad et al., 2016). The nature, occurrence, transport and effects of each PGRs are different according to their characteristics the risk of lodging in field crops,

breaking of bud dormancy, control of fruit set, improvement of fruit quality, acceleration or delay of fruit ripening for optimal harvesting, optimization of fruit storage and ripening, improved morphological structure, increases in yield, and modification of plant constituents (Alcázar et al., 2010; Choudhury et al., 2013; Rademacher, 2015; Fahad et al., 2016;

MATERIALS AND METHODS

Preparation of materials: Stem cuttings of Alugbati, scissors, Flowerpots, Ruler, ballpeen hammer, record book, 1 bottle of Salic salic acid, siren, and garden soil.

Seedling Care and Treatment Administration

The stem cuttings of Alugbati after transplanting were watered regularly, and the removal of weeds was done to avoid competition. From the time of transplanting, Alugbati seedlings were exposed continuously in an open area.

Experimental Design and treatments;

This exercise will use a completely randomized design(CRD) with two (2) treatments replicated four (4) times. The treatments were designated as follows;

Treatment 1, Control, did not receive any hormone spraying.

Treatment 2, treated with 10ml concentration of Salic salic acid (SA)

RESULTS AND DISCUSSION

Horticultural characteristics

July 9,2024

Planting Alugbati (Basella rubra Linn.) through Stem cutting with a 5 cm height, two treatment replicated (4) times, to compare the effect of Salic salic acid on the growth of Alugbati.

July 16, 2024

1 week after planted Alugbati, started to applied Salic salic acid concentration of (10ml SA) with 1 liter of water) through foliar application.

July 16,2024 **1st application of SA**

2ND week

3rd weeks 4th weeks

Table 1, show the height of Alugbati (Basella rubra Linn) after 30 days from (July16-August 16, 2024), from Treatment1, Control, with a mean of (88.75cm) while Treatment 2 (59cm) it was treated with 10ml Salic salic acid. but Treatment 1 obtained the highest number in terms of growth and height compared to treatments 2.

Table 1. Horticultural characteristics of plant Showing the height of Alugbati (cm) after 30 days (Overall length)

TREATMENT	**REPLICATION**				**TOTAL**	**MEAN**
	I	**II**	**III**	**IV**		
1	98	84	108	65	355	88.75
2	59	57	74	46	236	59
TOTAL	**157**	**141**	**182**	**111**	**591**	**73.87**

Table 1. ANALYSIS OF VARIANCE table for Completely randomized design

SV	**DF**	**SS**	**MS**	**F com**	**F tab**	
					5%	**1%**
Treatment	1	1770.13	1,770.13	0.11ns	5.99	13.74
Exp. Error	6	91,415.75	15,235.95			
TOTAL	7	93,185.88				

NS=not significant

Analysis of Variance in Table 1 showed a computed F value of 0.11, which is less than the 1% and 5% levels of significance of 5.99 and 13.74, respectively. This result means that there is no significant effect of Treatment 1 (Control) on the growth of Alugbati in terms of height compared to Treatment 2 (treated with 10ml concentration of Salicylic acid).

SUMMARY

The study was conducted at Upper San Raymundo, Shiek Mustafa Compound, Jolo, Sulu from July 9, 2024, to August 16, 2024. With the objectives: Determine the effect of salicylic acid on the growth of Alugbati and control. Preparation of materials: Stem cuttings of Alugbati, scissors, Flowerpots, Ruler, ballpeen hammer, record book, 1 bottle of Salicylic acid, siren, and garden soil.

This exercise will use a completely randomized design (CRD) with two (2) treatments replicated four (4) times. The treatments were designated as follows: Treatment 1, Control, did not receive any hormone spraying; Treatment 2, treated with a 10 mL concentration of Salicylic acid (SA), with the data gathered: final height of Alugbati within 30 days.

CONCLUSIONS

As we all know, Alugbati plants (Basella rubra Linn.) is a very nutritious and source of vitamins A,B, C and iron. And give more benefits in providing alternative ink, the leaves have potential laxative effect on bowel consistency, and have a high anthocyanin content.

Alugbati is easy to plant and survive either open area or shaded. and highly recommended to plant Alugbati without using any hormones to grow.

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