

A REVIEW ON EFFECT OF GIBBERELIC ACID (GA₃) ON GROWTH AND YIELD OF KAGZI LIME (*Citrus aurantifolia* Swingle).

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Introduction

Kagzi lime (*Citrus aurantifolia* Swingle.) belongs to family Rutaceae, originated in India. It is commercially grown in tropical and subtropical region of India. Acid lime is the third most important fruit after mandarin and sweet orange. India ranks fifth among major lime producing countries in the world Kagzi lime is one of the important citrus species, widely grown in India for various purposes. The fruits are extensively used for squashes, pickles, syrups and cordials, manufacture of citric acid and for table purpose in daily life of Indians. Lime is being acidic generally consumed as fresh but mostly used for flavouring vegetable dishes, fish, meat and salads. It also makes delicious and refreshing cold drinks. The fruits are valued not only for its nutritional qualities but also for medicinal purposes. Kagzi lime is commercially propagated through seeds in India as it comes true to type, because of high degree (39-60%) of nucellar embryony. In seed propagated plants better and quicker

germination of seeds and production of maximum number of seedlings are highly essential to meet the increasing demand of the cultivars in shortest possible time. In Kagzi lime germination percentage is low and it varies between 27-58 per cent and Kagzi lime takes about 3 weeks to germinate. The most serious problem in Kagzi lime propagation is heavy mortality with the seedlings in primary nursery stage. The seed coat of lime acts as a barrier because it interferes with early germination of seed due to presence of certain inhibitory substance.

Role of Gibberellic Acid on Citrus Plants

Gibberellic acid (GA) is used in citrus orchards to manipulate flowering and fruit development and reduce the incidence and/or severity of some physiological disorders that occur due to environmental conditions. Its effectiveness depends on application at the right concentration and right times. Gibberellic acid (GA) is a naturally occurring hormone or growth-regulating chemical that is found to varying degrees in all parts of plants.

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GA₃ stimulates both cell division and elongation and has been used to manipulate flowering and fruit development in selected horticultural crops for many years. GA₃ increase the fruit height, fruit diameter, fruit weight ultimately the yield was increased.

There are four key reasons for using GA on citrus:

- Reducing the severity and incidence of albedo breakdown
- Reducing the severity and incidence of watermark (mostly on Imperial mandarin)
- Reducing the severity and incidence of oleocellosis
- Improving rind quality.

Influence of Gibberellic Acid on seed germination and seedling growth of Kagzi lime

A study was conducted to estimate the influence of gibberellic acid (GA₃) at different concentrations in different time intervals on seed germination and seedling growth of kagzi lime. The results revealed that Maximum germination percentage (95%) was recorded under treatment with GA₃ 80 ppm for 12 hours, rate of germination of seeds (25 days), height of plant (18.79 cm) at 120 DAS, number of leaves per plant (26.53), fresh and dry weight of shoot (25.84 g and 14.44 g), tap root (17.44 cm), secondary and fibrous roots (5.98 cm and 85.99 cm), fresh as well as dry

weight (7.04 and 4.95 g), survival percentage (85 percent) in similar treatment. Therefore, it may be concluded that the GA₃ at 80 ppm has a significant effect on the seed germination and seedling growth of Kagzi Lime and can be recommended to the grower for obtaining better growth and yield.

Pre-harvest application of GA₃ has been reported to delay softening, delay rind colour, and minimize the fruits drops and puffiness. Pre-harvest spray of GA₃ in mandarin delayed ripening and decay loss of fruits. It is found that GA₃ was the most effective chemicals in increasing the weight, specific gravity and decreasing the total acid content in guava fruits. It suggested that GA₃ and kinetin are beneficial in prolonging the shelf life and retaining the quality of citrus fruits. The fruits treated with GA₃ extended the storage life of kagzi lime fruits over control by delaying in ripening. In citrus fruit, GA₃ application delayed the loss of chlorophyll. Exogenous application of growth regulators significantly decreased fruit drop leading to increase in total number of fruits per plants, fruit weight, juice percentage, total soluble solids, acidity, and vitamin C. Fruit skin colour advanced in GA₃ applied trees. GA₃ delayed the maturity and reduced the postharvest losses in kinnow mandarin.

GA₃ at 20 ppm was more effective to increase fruit weight and overall fruit quality

whereas GA₃ at 30 ppm was the best for the prolonging the shelf life and minimising the physiological loss in weight (PLW) and decay loss of mandarin in both ambient and cellar condition. GA₃ at 20 ppm retained higher fruit weight (128.6 g), higher peel puncture resistance (3.54 kg/cm²), higher juice recovery (57.75%), and higher TSS/acid ratio (21.24) during the storage. In overall, GA₃ was proved to delay the ripening of the fruits for one month through delaying the chlorophyll development and reducing the loss of texture, decreasing sugar content and increasing acidity.

References

1. <https://www.ijcmas.com/special/6/S.%20B.%20Jaiswal,%20et%20al.pdf>
2. [https://www.agric.wa.gov.au/citrus/improving-citrus-quality-using-gibberellic-acid#:~:text=Gibberellic%20acid%20\(GA%20is%20a,horticultural%20crops%20for%20many%20years.](https://www.agric.wa.gov.au/citrus/improving-citrus-quality-using-gibberellic-acid#:~:text=Gibberellic%20acid%20(GA%20is%20a,horticultural%20crops%20for%20many%20years.)
3. <https://updatepublishing.com/journal/index.php/jsa/article/view/4209>
4. http://researchjournal.co.in/upload/assignments/8_57-59_1.pdf

