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# Effects of Foliar Application of "Sakkaraa" Brewing on the Growth, Flowering and Fruit Setting of Cucumber *(Cucumis sativus*) Plants under Greenhouse Condition

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**Abstract:** Cucumber (*Cucumis sativus*) is an important vegetable crop of several countries in the tropics. "Sakkaraa", Sri Lankan name for jiggery (solidified sugary product) made by sugar cane stem extract. Sakkaraa brewing is an intricate process encompassing mixing and further elaboration of essential raw materials, including sugar, water and yeast. Foliar Sakkaraa brewing (yeast extract, 0.5% ethanol and 3% methanol) sprays resulted in significant growth stimulation in plants. The objectives of the present study were to examine the effects of Sakkaraa brewing on growth and flowering and fruit setting of ridge gourd plants. The study was conducted at greenhouse located in Horticultural crop Research and Development Institute, Gannoruwa (WU1). The experiment was laid out in a Complete Randomize Design (CRD) with three treatments randomized in twelve replicates. The treatments were $T_1$–20% Sakkaraa brewing, $T_2$–10% Sakkaraa brewing and $T_3$–Control (without Sakkaraa brewing). Plants were established in pots and standard crop management practices were done throughout the study. Sakkaraa brewing was sprayed to the seedlings 15 days after sowing. Measurements were taken on growing, flowering and Fruit setting stages. The highest values of plant growth parameters and reproductive parameters were observed in 20% Sakkaraa brewing applied treatment. On the other hand the lowest values were recorded from control of the experiment. Specially, advanced flowering and fruit setting were recorded from T1, i.e. 20% Sakkaraa brewing applied treatments. So, Sakkaraa brewing applied plants showed superior results in contrast to control with enhancing flowering as well as fruit setting performances.

**Key words:** Cucumber, Sakkaraa brewing, Flowering, Fruit setting.

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## Introduction

"Sakkaraa" brewing is a fermented aqueous drink based on cane sugar and yeast (*Saccharomyces cerevisiae)*. Sakkaraa brewing is an intricate process encompassing mixing and further elaboration of essential raw materials, including cane sugar, water and yeast. It contains $5x10^8$ yeast cells per $1mm^3$, 0.5% ethanol, 3% methanol and $p^H$ of the Sakkaraa brewing is 4.29.

Yeast as a natural source of cytokinins-stimulates cell division and enlargement as well as the synthesis and enlargement as well as the synthesis of protein, nucleic acid and chlorophyll (Kraig and Haber, 1980; Spencer *et al.*, 1983; Casel franco and Beale, 1983 and Fathy and Farid, 1996). It is used as a kind of biofertilizers in soil fertilization or in foliar application on the shoots of vegetable crops (El-Ghamring *et al.*, 1999). This is because it's content of many nutrient elements and being productive compounds of semi growth regulator compound like auxins, gibberellins and cytokinins (Glick, 1995). Moreover, Gomaa *et al.*, (2005) reported that inclusion the foliar application of yeast to the organic fertilization significantly increased potato yield in comparison with either the positive control or the corresponding treatments. Also, Hussain and Khalaf, (2007) found that spraying yeast solution treatments significantly increased plant height, number of branches/plant, dry matter of vegetative growth, number of tubers/plant, dry matter percentage of tubers, yield/plant, dry matter percentage of tuber, yield/plant and TSS. All the above mentioned characters were increased with increasing the foliar application of yeast treatments. Recently, Sarhan and Abdullah, (2010) mentioned that the treatments of yeast suspension caused gradual significant increase in plant height, number of aerial stem, leaves area, total chlorophyll and shoots dry matter percentage. Likewise, El-Tohamy *et al.*, (2008) found that foliar application of yeast increasing cytokinins content especially at the high level of yeast (10 g/l.). Yeast treatments had the best results concerning yield as well as N, P and K contents in the leaves.

Nonomura & Benson (1992) showed that foliar applications of methanol on a range of C3 plants increased growth rate and harvestable yield. Three applications of 10% methanol increased growth rate and yield of tomatoes without any symptoms of phyto toxicity to leaves. Nonomura and Benson's (1992) data supported the hypothesis that the increase in growth was because of an inhibition of photosynthate loss as a result of photo-respiration. Ethanol has also been shown to have effects in plant tissues, often associated with ethylene activity (Heins 1980; Saltveit 1989; Wu *et al.*, 1990; Mencarelli, 1991) and on stomatal resistance by its effect in removing leaf resin (Meinzier *et al.*, 1990). Young tomato plants were treated with foliar sprays of methanol and ethanol concentrations ranged from 5 to 20% v/v. foliar sprays resulted in significant growth stimulation. Both alcohols increased leaf and stem fresh and dry weights with the maximum increases at the highest concentrations tested (Rowe *et al.*, 1994). Advanced flowering and fruit setting, number of flowers per plant, number of female flowers per plant and number of fruits per plant were recorded from beer (ethanol 8.8%) applied treatments. So, beer applied plants showed superior results in contrast to control with enhancing flowering as well as fruit setting performances in bitter gourd (Kohombange *et al.*, 2019). The experiment reported here was designed to study the effects of foliar applied Sakkaraa brewing (yeast extract, 0.5% ethanol and 3% methanol) on the growth, flowering and fruit setting of cucumber plants under greenhouse condition.

## Methodology

The study was conducted at a greenhouse located in Horticultural Crop Research and Development Institute, Gannoruwa (WU1- Wet Zone area in Central Province), Sri Lanka. Plants were established in pots and standard crop management practices were done

throughout the study. Sakkaraa brewing (yeast extract, 0.5% ethanol and 3% methanol) was diluted at 40% and 30% and sprayed at one week intervals after transplanting of seedlings in pots. 6: 30: 30 fertilizer mixture was used as recommended fertilizers. The experiment was laid out in a Completely Randomize Design (CRD) with three treatments randomized in twelve replicates. The treatments of 20% and 10% Sakkaraa brewing applied to the seedlings to cover whole aerial parts of the plant at one week intervals as an aqueous spray by using a hand sprayer. Data were collected at one week intervals after first spraying. Measurements were taken on growth, flowering and fruit setting determining parameters.

| Treatments | Sakkaraa brewing levels (%) |
|---|---|
| T1 | 20% dilution of Sakkaraa brewing |
| T2 | 10% dilution of Sakkaraa brewing |
| T3 | Control (without Sakkaraa brewing) |

The data obtained were tabulated and analyzed subjected to the Analysis of Variance (ANOVA) procedure of Statistical Analysis System (SAS) 9.1. Duncan's New Multiple Range Test (DNMRT) was performed to compare the differences among treatment means at p=0.05. Correlation analysis was used to determine the strength of the relationships between measured parameters of cucumber.

## Results and Discussion

According to the table 1, there are significant differences between T1 i.e. 20% Sakkaraa brewing, T2 i.e. 10% Sakkaraa brewing and the T3 i.e. control of the experiment each other on plant height. Also, there is a significant difference between T2 i.e. 10% Sakkaraa brewing and T3 i.e. control with the T1 i.e. 20% Sakkaraa brewing on number of leaves per plant. The mean number of flowers per plants and the mean number of fruits per plants presented the significant difference between T1 and the T3 and T2 and the T3. However, the mean number of days for flower setting and the mean number of days for fruit setting presented significant differences between T1, T2 and T3 each other. These results numerated that, foliar application of Sakkaraa brewing is significantly increased (p>0.05) plant growth and reproductive parameters compared to control i.e. without Sakkaraa brewing. Also no phytotoxic effects were observed on any foliar treated plants.

**Table 1. Evaluation of plant growth and reproductive parameters of Cucumber**

| Treatment | Mean plant height (cm) | Mean number of leaves per plant | Mean number of flowers per plant | Mean number of fruits per plant | Mean number of days for flower setting | Mean number of days for fruit setting |
|---|---|---|---|---|---|---|
| T1 | $215.88^{a}$ | $38.44^{a}$ | $21.18^{a}$ | $1.81^{a}$ | $38^{a}$ | $55^{a}$ |
| T2 | $186^{b}$ | $27.81^{b}$ | $19.12^{a}$ | $1.75^{a}$ | $42^{b}$ | $58^{b}$ |
| T3 | $135^{c}$ | $25.44^{b}$ | $14.5^{b}$ | $0.75^{b}$ | $43^{c}$ | $62^{c}$ |

Note**:** Means followed by the same letter/s along the column are not significantly different at P=0.05

## Conclusion

The highest values of plant growth parameters and reproductive parameters were observed in 20% Sakkaraa brewing (yeast extract, ethanol 0.5%, methanol 3%) applied treatments. On the other hand the lowest values were recorded from control of the experiment. Specially, advanced flowering and fruit setting were recorded from 20% Sakkaraa brewing applied

treatments. So, Sakkaraa brewing applied plants showed superior results in contrast to control with enhancing flowering as well as fruit setting performances.

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## References

1. Castelfranco, P.A. and Beale, S.I. 1983. Chlorophyll biosynthesis: recent advances and areas of current interest. Annual Review of Plant Physiology, 34(1): 241-276.

2. El-Ghamriny, E.A., Arisha, H.M.E. and Nour, K.A. 1999. Studies on tomato flowering, fruit set, yield and quality in summer season. 1.-spraying with Thiamine, ascorbic acid and yeast. Zagazig Journal of Agricultural Research, 26(5): 1345-1364.

3. El-Tohamy, W.A., El-Abagy, H.M. and El-Greadly, N.H.M. 2008. Studies on the effect of putrescine, yeast and vitamin C on growth, yield and physiological responses of eggplant (*Solanum melongena* L.) under sandy soil conditions. Australian Journal of Basic and Applied Sciences, 2(2): 296-300.

4. Fathy, S.L. and Farid, S. 1996. Effect of some chemical treatments, yeast preparation and royal Jelly on some vegetable crops growing in late summer season to induce their ability towards better thermal tolerance. Journal of Agricultural Sciences, 25(4): 2215-2249.

5. Glick, B.R. 1995. The enhancement of plant growth by free-living bacteria. Canadian Journal of Microbiology, 41(2): 109-117.

6. Gomaa, A.M., Moawad, S.S., Ebadah, I.M.A. and Salim, H.A. 2005. Application of bioorganic farming and its influence on certain pests infestation, growth and productivity of potato plants. Journal of Applied Sciences Research, 1(2): 205-211.

7. Heins, R.D. 1980. Inhibition of ethylene synthesis and senescence in carnation by ethanol. Journal of the American Society for Horticultural Science, 105(1): 141-144.

8. Hussain, W. and Khalaf, L. 2007. Effect of foliar spraying with yeast solution on growth and yield of potato plant cv. desiree. html/www.tropentage.de/2007/abstracts/links/khalaf. FPRAXY 90.

9. Kohombange Shyamalee, Rajapaksha, R.G.A.S. and Nandun Rathnasekara. 2019. Effects of Foliar Application of Beer (Ethanol) on the Growth, Flowering and Fruit Setting of Bittergourd (*Momordica charantia* L.) Plants. International Journal of Research, 6(1): 501- 505.

10. Kriag, E. and J.E. Haber, 1980. Messenger ribonucleic acid and protein metabolism during sporulation of *Saccharomyces cerevisiae*. Journal of Bacteriology, 144(3): 1098-1112.

11. Meinzer, F.C., Wisdom, C.S., Gonzalez-Coloma, A., Rundel, P.W. and Shultz, L.M. 1990. Effects of leaf resin on stomatal behaviour and gas exchange of *Larrea tridentata* (DC.) Cov. Functional Ecology, 4(4): 579-584.

12. Mencarelli, F. and Hugo, L. 1991. Control of flower and bract abscission of Bougainvillea branches by ethanol solutions. Agricoltura Mediterranea, 121: 282-286.

13. Nonomura, A.M. and Benson, A.A. 1992. The path of carbon in photosynthesis: improved crop yields with methanol. Proceedings of the National Academy of Sciences, 89(20): 9794- 9798.

14. Rowe, R.N., Farr, D.J. and Richards, B.A.J. 1994. Effects of foliar and root applications of methanol or ethanol on the growth of tomato plants (*Lycopersicon esculentum* Mill). New Zealand Journal of Crop and Horticultural Science, 22(3): 335-337.

15. Saltveit, M.E. 1989. Effect of alcohols and their interaction with ethylene on the ripening of epidermal pericarp discs of tomato fruit. Plant Physiology, 90(1): 167-174.

16. Sarhan, T. and Abdullah, O.K. 2010. Effect of Azotobacter Inoculation, Dry Bread Yeast Suspension and Varying Levels of Urea on Growth of Potato Cv. Desiree. html/www.tropentage.de/2010/abstracts/full/628.

17. Spencer, T.F.T., Dorothy, S.M. and Smith, A.R.W. 1983. Yeast genetics fundamental and applied aspects. Springer-Verlag, New York, USA, 16-18 pp.

18. Wu, M.J., Zacarias, L., Saltveit, M. and Reid, M.S. 1990. Effect of alcohols on Carnation senescence. Proceedings of the XXIII International Horticultural Congress, Firenze 2, Abstract 3402.