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Research Article

Gibberellic Acid (GA_3) Productions from Regular Dry Bakery Yeast (Saccharomyces Cerevisiae)

Arwa A. Tawfiq[1], Mustafa R. Al-Shaheen[2], Mukhalad H.I. Al-ani[3]

[1]Baghdad University/ College of Science for Women
[2]Department of Field Crop, College of Agriculture, University of Anbar, Anbar, Iraq.
[3]Department of Horticulture, Agriculture College, Anbar University, Anbar, Iraq.

Abstract

This study tested the viability of yeast to produce of growth regulators, including Gibberellic acid form of free and linked. The results showed the possibility of producing Gibberellic acid by using regular yeast bread quantities appropriate and economically viable,was shown in the results.

Keywords: Gibberellic acid, Regular dry bakery yeast, Saccharomyces cerevisiae

Introduction

Plant growth regulators such as gibberellins and cytokinins were important biotechnological and economical products. They were commonly used in agriculture, viticulture, gardens and horticulture (Rademacher, 2015). Gibberellins (GAs) were a large group of important diterpenoid acids among commercial phytohormones (Karakoç and Aksöz, 2006). They were endogenous hormones functioning as plant growth regulators and influencing a range of developmental processed in higher plants including stem elongation, germination, dormancy, sex expression and fruit senescence (Takahashi et al., 2012). The GAs were naturally produced by higher plants, fungi bacteria regulate plant growth and development. They were typical secondary metabolites in microorganisms; however, they acted as endogenous hormones in higher organisms such as plants. Over the past 20 years, many gibberellins had been defined using modern analytical techniques and 126 GAs had been identified in plants, fungi, and bacteria (Rodrigues et al., 2012).

Gibberellic acid (GA) was the main product of gibberellins in fungi and bacteria. It was a terpenoid hormone that was an important phytohormone regulating plant growth and development. It was used in agriculture, nurseries, greenhouses, viticulture, cosmetic sectors and beer industry (Hasan, 2002). Currently, GA was largely produced by submerged fermentation of the fungus Gibberella fujikuroi on an industrial scale. It was also synthesized by several bacteria, such as Azotobacter, and Azospirillium in culture medium and from wild strains of fungi such as Sphaceloma sp., Phaeosphaeria sp., and Neurospora sp.(Sridevi and Mallaiah, 2008). Production of GA was considerably influenced by cultural conditions. Some of the important factors in obtaining high yields of the GA included pH, temperature, incubation time and conditions such as optimization of the fermentation media. There was no current research indicated to GA production and quantities of the regular dry bakery yeast (Saccharomyces cerevisiae), but it should be noted that the yeast was a natural source of cytokinins that had implications for stimulating the growth in the plant (Rodrigues et al., 2012).

Materials and Method

Production of gibberellic acid was examined in dry bakery yeast (saccharomyces cerevisiae) for determination the levels of this plant growth regulator by used a spectrophotometer. it was extracted and determined gibberellic acid depending on the method used in (Ergün et al., 2002) modified already

Corresponding Author: Mustafa R. Al-Shaheen. College of Agriculture, University of Anbar, Iraq.
E-mail Id: alani2005ms@yahoo.com
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from (Unyayar et al., 1996). As it was shown in Figure 3.4, were taking 1gram of dry yeast was added to 60 ml of extraction solution consisting of methanol: chloroform: ammonium hydroxide (2n) in the lineage (12:5:3) ml respectively, and saved it under the freezer temperature of 6 until the subsequent analyzed. This combination was added 25 ml of distilled water, then separated into two layers lower consisting of the chloroform (neglected not contained the hormone) and higher representd the aqueous phase (water.Methanol), was conducted the following modifications: PH was adjusted to 2.5 with 1N NaOH or 1N HCl then extracted three times with Ethyl acetate (15 ml), every time the upper layer which represented ethyl acetate (which containad gibberellic acid freely), for the lower layer of water, it had adjusted the pH to 7 and extracted three times with Ethyl acetate, It was taken the lower layer, The pH was adjusted to11 hydraulically analyzed for an hour at a temperature of 70 ° C .

It was taken the aqueous phase, the pH was adjusted to 7 and extracted three times with Ethyl acetate, neglected the upper layer and took the lower layer, PH was adjusted to 2.5 and extracted three times with Ethyl acetate. It was taken the upper layer which lt represented Ethyl acetate (Contained gibberellic acid as linked) neglected the lower layer. It took ethyl acetate layer containing the hormone as of free and associated. lt was evaporated for the purpose of obtaining a residuum represened the hormone each sample was added 3 ml methanol and analysis by UV-VIS spectrophotometer deviced for the purpose of measuring the quantities. Gibberellic acid was measured at wavelength 254 nm and calculated the concentration of growth regulator to the demodulator in reference to the standard curved for gibberellic acid.

Result and iscussion

The results showed a good percentage of the GA_3 in regular dry bakery yeast (Saccharomyces cerevisiae), Demonstrating the ability of regular dry bakery yeast in the production of this hormone in the free associated form. The concentration of free GA_3 was 382 mcg/ml associated GA_3 reached 417 mcg/ml while the total GA_3 799 mcg/ml at a wavelength 254 nm Figure 7.1. There were no recent studies had shown indicated the presence ratios of this hormone in the regular dry bakery yeast (Saccharomyces cerevisiae), but one of the older studies indicated to the existence of Auxin. it was subtracted by regular dry bakery yeast (Saccharomyces cerevisiae) in the culture medium, (Robinson, 2012) Pointed out. The amount of Auxin were found in growth medium, it exceeded the amounts had been drawn directly from the yeast cells. The amounts of Auxin were increased with the rise of sucrose concentration in the growth medium and lt decreased with increasing concentration of peptone, that the highest percentage of Auxin reached 119.82 mg/ml when there was a concentration of 10% sucrose, either added peptone, it led to increase rate of Auxin. This study was the first one would suggest to GA_3 production by using the regular dry bakery yeast. As we mentioned earlier, it was the regular dry bakery yeast a natural source for Cytokinins, that lt stimulated cell division and expansion as well as protein synthesis, amino acids, and chlorophyll (Fathy and Farid, 1996). The fungus had the ability to produce the growth regulators, have indicated (Hasan, 2002) that all fungal isolates of the genera Fusarium had the ability to produce GA_3 and IAA, while lt isolated of the other genera, such as Aspergillus, Penicillium, and Rhizopus. lt did not have the ability to produce the IAA but it coud produce GA_3. Also that the Pseudomonas bacteria isolated from the remnants of olive oil processing had the ability to production GA_3 lt was reached the maximum amount of produced 285.06 mg/ml. after 72 hours in the culture medium. the production GA_3 of these bacteria were better than the production of fungus Gibberellafujicuroi which. Gave the best productivity in 30 °c for 72 h at ph 7 on a rotary shaker and in the dark (Karakoç and Aksöz, 2006).

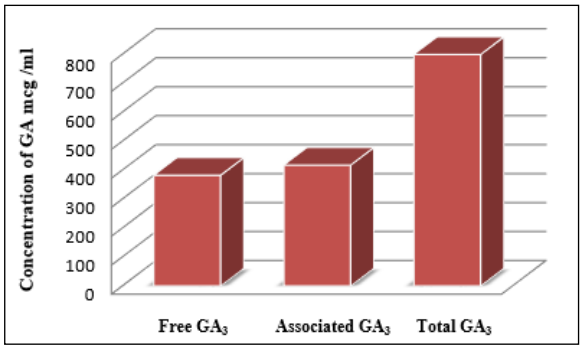

Figure .. The concentration of free, associated and total Gibberellic acid (GA_3) (GA_3) in the culture medium of regular dry bakery yeast (Saccharomyces cerevisiae)

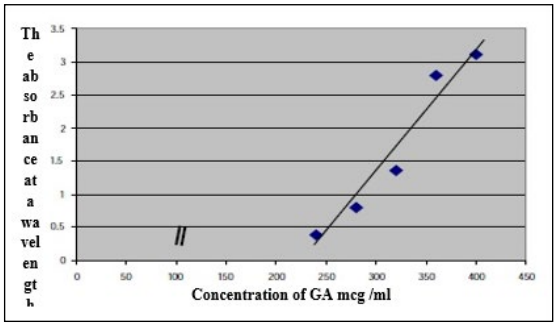

Figure .. the standard curved of Gibberellic acid (GA3) at wavelength 254 nanometers (nm)

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