SELECTION OF NUTRIENT MEDIUM THAT ENSURES MODERATE GROWTH OF MICROALGAE

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Abstract

In the article, in order to meet the requirements for the general fertility of the seeds of agricultural crops in order to ensure the fertility of the seed, our researches showed that the strain B. braunii-AnDI-115 belonging to the genus Botryococcus (B braunii-AnDI-115) and Ch.infusionum -AnDI-76 strains belonging to the Chlorococcum genus (Ch.infusionum -AnDI-76) are selected.

Keywords: *B. braunii*-AnDI-115 and*Ch. infusionum*-AnDI-76,Seth medium, Tamiya medium, Modified Tamiya medium #1, Modified Tamiya medium #2, CHu - 13 medium, Chu -10 medium, Hoagland's medium, BG-11 medium, Bold basal medium (Bold's Basal Medium (BBM)), Zarruk nutrient medium.

Introduction

It is known from scientific sources that researches are planned for the cultivation of algal objects on an industrial basis based on its target characteristics [Özdemir., 2016]. The main purpose of this is to reduce the economic indicators, including the cost of the finished product, the selection of its preparation form, and the facilitation of the application process. Also, determining the safety indicators of algal objects is one of the important aspects. This process is mostly related to biopreparations based on cyanobacteria.

It is necessary to develop a special nutrient medium composition for selected microorganisms, which is one of the organic laws of the biotechnology network. A specially selected nutrient medium should meet such indicators as the moderate growth of this microbe-object, the production of sufficient biomass, and the maximum synthesis of the target substances in the biomass.

It is known from scientific sources that microalgae show their chemical nature depending on the composition of the nutrient medium [Thomas G. Tornabene et al., 1985; Kiran et al., 2021]. For large-scale cultivation of microalgae showing high performance in controlling plant growth, there are several nutrient media compositions, and these nutrient media are developed separately for strains belonging to the same genus or species [Muzaffarov i

Ph.D., 1984; Saikia et al., 2011; Alejandra Sánchez-Bayo et al., 2020; Charmaine Lloyd et al., 2021].

Purpose of work. B. braunii-AnDI-115, which exhibits biostimulatory properties, and*Ch. infusionum*-AnDI-76is to choose a moderate nutrient medium for large-scale cultivation of strains.

Sources and methods used. To ensure seed germination qOur studies belong to the genus Botryococcus, as it meets the requirements for the general fertility of agricultural crop seeds.*B. braunii*-AnDI-115 strain (B. braunii-AnDI-115) and*Chlorococcum*Ch.infusionum -AnDI-76 strain (Ch.infusionum -AnDI-76) belonging to the genus was carried out.

For the cultivation of microalgae, 10 nutrient media with different composition were used (Table 1).

Table 2.2.1

In growing microalgaenutrient media used

No	**Name of the feeding medium**	**Composition of feed medium, g/l**	Source
1.	**Seth nutrient medium**	KNO3-2.02; KH2PO4 -0.34; MgSO4×7H2O – 0.99; FeEDTA-0.0185; Ca(NO3)2×4H2O-0.01; H3BO3-0.00309; MnSO4×4H2O-0.0012; CoSO4-0.0014; CuSO4×5H2O-0.00124; ZnSO4-0.00143; (NH4)6Mo7O24×4H2O-0.00184.	Hielscher-Michael et al, 2016
2.	**Tamiya nutrient medium**	KNO3-5; FeSO4×7H2O-0.003; MgSO4×7H2O-2.5; KH2PO4-1.25; EDTA-0.037; solution of trace elements (ml/l): 1 ml (ZnSO4×4H2O - 0.222; MnCl2×4H2O - 1.81; MoO3-176.4 mg/10 l; N3VO3 -2.86; NH4VO3-229.6 mg/10 l .	Safarov and others, 2020
3.	**Modified Tamiya nutrient medium #1**	KNO3-7.5; MgSO4×7H2 O-3.75; KH2 PO4-1.25; Ca(NO3)2-0.15; FeSO4×7H2O-0.003; EDTA-0.185. Solution of trace elements -1 ml: g/l: H3BO3-2.86; MnCl2×4H×O-1.81; ZnSO4×7H2O-0.222; MoO3–176.4 mg/10l; NH4VO3-229.6 mg/10 l; CuSO4×5H2O-0.01 mg/l; Co(NO3)2×4H2 O-0.146; KJ-0.083; NaWO4×H2O-0.033; NiSO4(NH4)SO4×6H2O-0.198.	Mitishev and Dr., 2017
4.	**Modified Tamiya**	(NH4)2SO4-3.0; MgSO4×7H2O-3.75; KH2PO4-1.87; FeSO4×7H2O-0.0045; EDTA-0.185. Solution	Mitishev and Dr.,

	nutrient medium #2	of trace elements -1 ml: g/l: H3BO3-2.86; MnCl2×4H×O-1.81; ZnSO4×7H2O-0.222; MoO3–176.4 mg/10l; NH4VO3-229.6 mg/10 l; CuSO4×5H2O-0.01 mg/l; Co(NO3)2×4H2O-0.146; KJ-0.083; NaWO4×H2O- 0.033; NiSO4(NH4)SO4×6H2O-0.198.	2017
5.	**CHu - 13 nutrient medium**	KNO3-0.2, K2HPO4-0.04, MgSO4×7H2O-0.1, CaCl2×6H2O–0.08, iron citrate–0.01, citric acid–0.1, boron–0.5 ppm, MnSO4 ×7H2O-0.5 ppm, CuSO4×5H2O-0.02 ppm, CoCl2×2H2O-0.02 ppm, Na2MoO4×2H2O-0.02 ppm, pH 7.5.	Bozoro va et al., 2021
6.	Chu -10 nutrient medium	Na2SiO3×9H2O-5; Ca(NO3)2×4H2O-57.56; K2HPO4-10; MgSO4×7H2O- 25; Na2CO3-20;Vitamin B12 – 5mg/5ml is prepared in water; Biotin - 1 mg/10ml is prepared in water. Na2EDTA×2H2O-1.00; Iron citrate-6.00; Citric acid-6.00; H2SeO3-0.163. pHAdjusted with Na2SiO3×9H2O. If there is no iron citrate or citric acid, add FeCl3×6H2O-3.15 g/l and Na2EDTA×2H2O-4.36 g/l, 1 ml per 1 liter. Metal elements (g/l): H3BO3-2.86; MnCl2×4H2O-1.81; ZnSO4×7H2O-0.222; Na2MoO4×2H2O-0.390; CuSO4×5H2O-0.079; Co(NO3)2×6H2O-0.0494.	Stein., 1973
7.	**Hoagland's nutrient medium**	(NH4)2NO3-0.115; H3BO3-0.008; Ca(NO3)2 – 0.656; CuSO4 – 0.08 mg; Fe(C4H4O6)3 -0.005; MgCl2 – 0.24; MnCl2 -0.016 mg; KNO3 – 0.3; ZnSO4 -0.22 mg.	Anders on., 2005
8.	**BG-11 nutrient medium**	NaNO3-1.5 CaCl2×2H2O-0.036 Iron ammonium citrate-0.012; EDTA×Na2×2H2O-0.001; K2HPO4-0.04; MgSO4×7H2O-0.075; Na2CO3-0.02; Solution of trace elements - 1 ml/l: H3BO3-2.86; MnCl2×4H2O-1.81; ZnSO4×7H2O-0.222; Na2MoO4×2H2O-0.39; CuSO2×5H2O-0.079; Co(NO3)2×6H2O-0.049	Ji Won Hong et al., 2016
9.	**Bold's Basal Medium**	NaNO3-25; CaCl2×2H2O-2.5; MgSO4×7H2O-7.5; K2HPO4-7.5; KH2PO4-17.5; NaCl-2.5; EDTA (31 g KOH)- 50; FeSO4×7H2O (1 ml H2SO4)-	Anders on., 2005

	(BBM)	4.98; H3BO3-11.42; ZnSO4×7H2O-8.82; MnCl2×4H2O-1.44; CuSO4×5H2O-1.57; Co(NO3)2×6H2O-0.49	
10.	**Nutrient medium**	NaHCO3 -16.8; K2HPO4×3H2O- 1.0; NaNO3 - 2.5; K2SO4 - 1.0; NaCl - 1.0; MgSO4×7H2O- 0.2; CaCl2×2H2O- 0.04; Fe+EDTA-1.0 ml; Solution 1 of trace elements (g/l): H3BO3 -2.86; MnCl2×4H2O-1.81; ZnSO4×7H2O-0.22; CuSO4×5H2O-0.08; MoO3-0.015. 2-micronutrient solution (g/l): NH4VO3 - 0.023; K2Cr2 (SO4)4×24H2O - 0.096; NiSO4×7H2O - 0.048; Na2WO4×2H2O - 0.018; Ti2(SO4)3 - 0.040; Co(NO3)2×6H2O -0.044.	Anderson., 2005

Standard values were adopted as some technological parameters to study the specific characteristics of algal objects, among which the environmental parameters of all nutrient mediums were taken as pN-6.8. For the process of air supply of objects, air was supplied by spraying at the rate of 50 m3/l. Also, SO2 was given by spraying twice daily in the amount of 1% of the total volume. Also, all studies were repeated at least three times, and the obtained results were analyzed based on Fisher's values.

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