

Growth of *B. Braunii-Andi-115* and *Ch. Infusionum-Andi-76* Strains in Hoagland's Feed Medium and Zarruk Feed Medium

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Abstract

The article consists of studying the growth and development of *B. braunii-AnDI-115* and *Ch.infusionum-AnDI-76* strains in Hoagland's nutrient medium and zarruk nutrient medium, and the effect on the production of biomass and pigments in relation to dry matter.

Keywords: hoagland's nutrient medium, zarruk nutrient medium, *B.braunii-AnDI-115* and *Ch.infusionum-AnDI-76* strains Tamiya №1, Tamiya №2, Setlik, CHu-10, CHu-13.

Introduction: Table 3.2.9 shows growth indicators and some biochemical characteristics of microalgae in Hoagland's medium. When *B. braunii-AnDI-115* strain was grown in Hoagland medium, analysis showed that, 3.3×10^2 cells/ml on the 3rd day of cultivation, 4.2×10^4 cells/ml on the 7th day of cultivation, 6.2×10^5 cells/ml on day 10, while *Ch.infusionum-AnDI-76* strain showed 3.6×10^2 cells/ml on day 3 of culture, and 3 on day 7 of culture , 8×10^4 cells/ml, and on the 10th day of cultivation, it showed 5.5×10^5 cells/ml. It was found that *B. braunii-AnDI-115* strain grown in Hogland nutrient medium accumulated 9.01 g/l, and *Ch. infusionum-AnDI-76* strain 8.12 g/l of biomass. The amount of total pigments synthesized by *B. braunii-AnDI-115* strain grown in Hogland medium was 27.22 mg/l, and the amount of total pigments synthesized by *Ch. infusionum-AnDI-76* strain was 24.81 mg/l. It was found that the amount of carotenoids in relation to total pigments was 12.38% in *B. braunii-AnDI-115* strain, while in *Ch. infusionum-AnDI-76* strain it was slightly more, 13.95%. It was determined that when *B.braunii-AnDI-115* strain was grown in Hoagland nutrient medium, the content of chlorophyll a was 14.33 mg/l, the amount of chlorophyll b was 9.52 mg/l, and the amount of total carotenoids in pigments was 3.37%. *Ch.infusionum-AnDI-76* strain grown in the same medium had chlorophyll a content of 13.27 mg/l, chlorophyll b content of 8.08 mg/l, total carotenoid content in pigments was 3.46% organization was noted. It was found that in the *B. braunii-AnDI-115* strain, the ratio of chlorophyll a and b synthesized in this nutrient medium is 1.5, and in the *Ch. infusionum-AnDI-76* strain, it is 1.6.

Table-3.2.9

Growth indicators and some biochemical characteristics of algological objects in Hoagland nutrient medium

№	Selected algological objects	Number of cells in days			Cell dry mass, g/l	Amount of pigments, mg/l					
		3	7	10		chlorophyll a	chlorophyll b	Amount of total carotenoids, %	Amount of total pigments	Amount of carotenoids relative to total pigments, %	Ratio of a and b chlorophyll
1.	<i>B. braunii- AnDI-115</i>	$3,3 \times 10^2$	$4,2 \times 10^4$	$6,2 \times 10^5$	$9,01 \pm 0,37$	$14,33 \pm 0,33$	$9,52 \pm 0,62$	$3,37 \pm 0,23$	$27,22 \pm 0,63$	$12,38 \pm 0,25$	1,5
2.	<i>Ch. infusionum- AnDI-76</i>	$3,6 \times 10^2$	$3,8 \times 10^4$	$5,5 \times 10^5$	$8,12 \pm 0,42$	$13,27 \pm 0,48$	$8,08 \pm 0,18$	$3,46 \pm 0,48$	$24,81 \pm 0,72$	$13,95 \pm 0,46$	1,6

Table-3.2.9.1

Effect of microalgae grown in Hoagland nutrient medium on seed germination										
№	Selected algological objects	Seed germination in days, %			Biometric parameters of 15-day seedlings			Chlorophyll content of 15-day seedlings, mg/g of dry leaves		
		3	5	7	Seedling length, cm	Seedling wet mass, g	Root mass, g	a	b	a+b
1.	<i>B. braunii</i> - AnDI-115	38,12±0,24	52,32±0,41	68,37±0,18	4,38±0,16	8,13±0,45	0,08±0,23	18,32±0,11	8,62±0,09	26,94±0,32
2.	<i>Ch. infusionum</i> -AnDI-76	41,51±0,43	72,32±0,25	76,62±0,18	5,12±0,41	9,12±0,62	0,09±0,42	19,46±0,48	7,96±0,31	27,42±0,52
3.	Control (IUK, 10 ⁻³ M)	49,26±0,27	62,17±0,38	92,28±0,36	9,42±0,52	14,08±0,51	0,83±0,38	15,34±0,13	7,62±0,47	22,96±0,18

Results: The results of the study on the effect of microalgae grown in Hoagland nutrient medium on seed germination and pigment formation in seedlings are shown in Table 3.2.9.1.

When the obtained results is compared, the germination of the seed treated with the culture fluid of the *B. braunii*-AnDI-115 strain was 38.12% on the 3rd day of observation, 52.32% on the 5th day, and 68.37% on the 7th day of observation. It was noted that these indicators showed less fertility compared to the control variant by 11.14% on the third day, 9.85% on the 5th day of observation, and 23.91% on the 7th day of observation. On the 3rd day of observation, the germination of the seed treated with the culture fluid grown by strain *Ch. infusionum*-AnDI-76 was 7.75% less than that of the control, while it was 3.39% less than that of *B. braunii*-AnDI-115. it was noted that it showed a high index. Also, on the 5th day of observation, it was found that 10.15% higher viability compared to the control, 20.0% higher compared to the *B. braunii*-AnDI-115 strain. On the 7th day of observation of seed germination, it was observed that 15.66% less germination was observed compared to the control, and 8.25% more germination compared to the *B. braunii*-AnDI-115 strain.

It was noted that the biometric parameters of seedlings grown by processing with cultures grown in Hogland nutrient medium differed from each other. In particular, the length of seedlings grown under the influence of *B. braunii*-AnDI-115 strain was 4.38 cm, the wet biomass of seedlings was 8.13 g, and the root mass was 0.08 g, while *Ch. infusionum*- Seedlings grown under the influence of AnDI-76 strain were 5.12 cm in length, 9.12 g of seedling wet mass, and 0.09 g of root mass. According to the obtained results, it was found that the control option has a clear advantage in all parameters of biometric observations. In particular, it was determined that the length of seedlings was 9.42 cm, the wet biomass of seedlings was 14.08 g, and the root mass was 0.83 g.

It can be seen that the chlorophyll's content of seedlings grown in Holgland's nutrient medium was slightly higher than the control. Particularly, the amount of chlorophylls a and b of the seedlings grown under the influence of *B. braunii*-AnDI-115 strain in relation to control is 3.98 mg/g compared to the chlorophylls a and b of the seedlings grown under the influence of *Ch. infusionum*-AnDI-76 strain amount was 4.46 mg/g (dry leaf basis) higher than the control.

Also, the chlorophyll a content of the control variant is 2.98 mg/g higher than the chlorophyll a of the seedlings grown under the influence of the *B. braunii*-AnDI-115 strain, and the chlorophyll a of the seedlings grown under the influence of the *Ch. infusionum*-AnDI-76 strain is 2.98 mg/g. it was observed that it was less than 1.14 mg/g. According to the content of chlorophyll b, the control variant (7.62 mg/g) was significantly higher than the *B. braunii*-AnDI-115 (8.62 mg/g) and *Ch. infusionum*-AnDI-76 (7.96 mg/g) strains. it was found that it showed low performance.

Table 3.2.10 shows the results of synchronous reproduction, biomass production, and general pigment synthesis of cells of *B. braunii*-AnDI-115 strain and *Ch. infusionum*-AnDI-76 strain grown in Zarruk nutrient medium, widely used in practice. results are displayed.

Based on the comparative comparison of the obtained results, the *B. braunii*-AnDI-115 strain grown in Zarruk nutrient medium was 6.8×10^2 cells/ml on the 3rd day of cultivation, 3.6×10^4 cells/ml on the 7th day of cultivation, o showing 5.3×10^6 cells/ml on the 10th day of culture, compared to Setlik (Table 3.2.1) and modified Tamiya №1 (Table 3.2.3) nutrient medium, Tamiya (3.2.2 -table), it was observed that modified Tamiya №2 (Table 3.2.4) and CHu-10

(Table 3.2.6) produced more cells per layer compared to the culture medium, CHu-13 (Table 3.2.5 -table), it was noted that it showed a slightly lower index (5.3×10^6 cells/ml) compared to BG-11 and Hoagland nutrient media. Also, the Ch.infusiumum-AnDI-76 strain grown in Zarruk medium had 3.6×10^2 cells/ml on the 3rd day of cultivation, 4.3×10^4 cells/ml on the 7th day of cultivation, and 4.7×10^6 cells/ml on the 10th day of cultivation. It was found that it showed an indicator of 4.7×10^6 cells/ml on the day.

Table-3.2.10

Indicators of growth and some biochemical characteristics of algological objects in the nutrient medium of Zarruk

№	Selected algological objects	Number of cells in days			Cell dry mass, g/l	Amount of pigments, mg/l					
		3	7	10		chlorophyll a	chlorophyll b	Amount of total carotenoids, %	Amount of total pigments	Amount of carotenoids relative to total pigments, %	Ratio of a and b chlorophyll
1.	<i>B. braunii</i> -AnDI-115	$6,8 \times 10^2$	$3,6 \times 10^4$	$5,3 \times 10^6$	$14,27 \pm 0,34$	$21,42 \pm 0,11$	$11,33 \pm 0,09$	$5,38 \pm 0,51$	$38,13 \pm 0,28$	$14,11 \pm 0,08$	1,9
2.	<i>Ch. infusiumum</i> -AnDI-76	$3,6 \times 10^2$	$4,3 \times 10^4$	$4,7 \times 10^6$	$13,62 \pm 0,18$	$19,28 \pm 0,29$	$10,42 \pm 0,47$	$5,42 \pm 0,34$	$35,12 \pm 0,41$	$15,43 \pm 0,38$	1,9

Note: The initial number of cultured cells is 1.1×10^2 ; Cell dry mass and pigment content were determined in 10-day-old cells. $P < 0.05$

Table-3.2.10.1

Effect of microalgae grown in seed nutrient medium on seed germination

№	Selected algological objects	Seed germination in days, %			Biometric parameters of 15-day seedlings			Chlorophyll content of 15-day seedlings, mg/g of dry leaves		
		3	5	7	Seedling length, cm	Seedling wet mass, g	Root mass, g	a	b	a+b
1.	<i>B. braunii</i> -AnDI-115	$42,23 \pm 0,36$	$58,47 \pm 0,35$	$68,37 \pm 0,32$	$8,17 \pm 0,28$	$15,03 \pm 0,11$	$0,12 \pm 0,33$	$14,21 \pm 0,09$	$9,34 \pm 0,66$	$23,55 \pm 0,13$
2.	<i>Ch. infusiumum</i> -AnDI-76	$40,35 \pm 0,27$	$53,15 \pm 0,33$	$76,62 \pm 0,14$	$7,43 \pm 0,51$	$13,46 \pm 0,32$	$0,10 \pm 0,17$	$13,18 \pm 0,42$	$6,42 \pm 0,53$	$19,6 \pm 0,44$
3.	Control (IUK, $10^{-3}M$)	$51,16 \pm 0,52$	$71,11 \pm 0,25$	$93,23 \pm 0,27$	$11,72 \pm 0,22$	$17,14 \pm 0,47$	$0,91 \pm 0,14$	$14,62 \pm 0,71$	$6,82 \pm 0,48$	$21,44 \pm 0,28$

Ch.infusionum-AnDI-76 strain on the synchronous increase in the number of cells compared to Setlik (Table 3.2.1) and modified Tamiya No. 1 (Table 3.2.3) medium in two layers, Tamiya (Table 3.2.2), modified Tamiya No. 2 (Table 3.2.4) and CHu-10 (Table 3.2.6) were observed to produce a higher number of cells per layer compared to the nutrient medium, while CHu-13 (Table 3.2.5), It was found that BG-11 and Hoagland medium showed slightly lower cell count (4.7×10^6 cells/ml).

Discussion: B.braunii-AnDI-115 strain (14.27 g/l) and Ch.infusionum-AnDI-76 strain (13.62 g/l) cultured in Zarruk nutrient medium also in terms of dry biomass production characteristics it was found that it produced more biomass compared to other nutrient media, although it showed similar indicators. In particular, B. braunii-AnDI-115 strain 9.47 g/l, Ch. infusionum-AnDI-76 strain 11.02 g/l, B. braunii-AnDI-115 strain 9 compared to Tamiya nutrient medium, 87 g/l, strain Ch.infusionum-AnDI-76 8.82 g/l, strain B. braunii-AnDI-115 10.17 g/l, strain Ch.infusionum-AnDI-76 compared to that in modified Tamiya No. 1 nutrient medium 9.72 g/l, compared to modified Tamiya No. 2 nutrient medium, B. braunii-AnDI-115 strain 6.17 g/l, Ch. infusionum-AnDI-76 strain 6.42 g/l, compared to CHu-10 nutrient medium B. braunii-AnDI-115 strain 3.07 g/l, Ch. infusionum-AnDI-76 strain 1.22 g/l, B. braunii-AnDI-115 strain 0.67 g/l compared to CHu-13 nutrient medium more, Ch.infusionum-AnDI-76 strain 1.08 g/l less, B.braunii-AnDI-115 strain 0.74 g/l, Ch.infusionum-AnDI-76 strain $0,61$ g/l less, B.braunii-AnDI-115 strain 5.26 g/l, Ch.infusionum-AnDI-76 strain 5.5 g/l more, compared to BG-11 medium B. It was found that .braunii-AnDI-115 strain produces 0.14 g/l more, and Ch.infusionum-AnDI-76 strain produces 0.89 g/l less biomass.

It was observed that B. braunii-AnDI-115 strain grown in Zarruk medium produced 38.13 mg/l, Ch. infusionum-AnDI-76 strain 35.12 mg/l of total pigments. In the course of research, it was noted that there is a significant difference in carotenoid content compared to general pigments. In particular, it was found that B. braunii-AnDI-115 strain, 15.43% of Ch.infusionum-AnDI-76 strain grown in zarruk nutrient medium contains 14.11% carotenoids. There are also significant

differences in the description of the amount of pigments in this nutrient medium. The *B. braunii*-AnDI-115 strain grown in Zarruk nutrient medium synthesizes 21.42 mg/l of chlorophyll a and 11.33 mg/l of chlorophyll b. it was determined that the amount of total carotenoids was 5.38%. It was observed that *Ch. infusionum*-AnDI-76 strain synthesizes 19.28 mg/l of chlorophyll a and 10.42 mg/l of chlorophyll b in the same nutrient medium, and the amount of total carotenoids in pigments is 5.42%. In addition, it was found that the ratio of chlorophyll a and chlorophyll b is 1.9 in *B. braunii*-AnDI-115 and *Ch. infusionum*-AnDI-76 strains grown in Zarruk medium.

Conclusion: The results of the study on the effect of microalgae grown in Zarruk nutrient medium on seed germination and pigment formation in seedlings are shown in Table 3.2.10.1. When we compared the obtained results, the germination of the seed treated with the culture fluid of the *B. braunii*-AnDI-115 strain was 42.23% on the 3rd day of observation, 58.47% on the 5th day, and 68.37% on the 7th day of observation. it was noted that these indicators showed less fertility compared to the control variant by 8.93% on the third day, 12.64% on the 5th day of observation, and 24.86% on the 7th day of observation.

It was noted that the germination rate of the seed treated with the culture fluid grown by *Ch. infusionum*-AnDI-76 strain was 10.81% lower than the control and 1.88% lower than the *B. braunii*-AnDI-115 strain on the 3rd day of observation. Also, on the 5th day of observation, it was found that 17.96% less viability compared to the control, 5.32% less than the *B. braunii*-AnDI-115 strain. It was found that on the 7th day of monitoring the fertility of the young, compared to the control, it showed 16.61% lower fertility, and 8.25% more fertility compared to the *B. braunii*-AnDI-115 strain.

It was noted that the biometric parameters of seedlings grown by processing with cultures grown in Zarruk nutrient medium are also different. In particular, the length of seedlings grown under the influence of *B. braunii*-AnDI-115 strain was 8.17 cm, the wet biomass of seedlings was 15.03 g, and the root mass was 0.12 g, while *Ch. infusionum*- It was noted that the length of seedlings grown under the influence of AnDI-76 strain was 7.43 cm, the wet mass of seedlings was 13.46 g, and the root mass was 0.10 g. According to the obtained results, it was found that the control option has a clear advantage in all parameters of biometric observations. In particular, it was determined that the length of seedlings was 11.72 cm, the wet biomass of seedlings was 17.14 g, and the root mass was 0.91 g.

It can be seen that the chlorophyll content of the plants treated with the cultures grown in Zarruk nutrient medium showed somewhat higher values compared to the control. In particular, the amount of chlorophyll a and b of the seedlings grown under the influence of *B. braunii*-AnDI-115 strain is 2.11 mg/g higher than the control, and the a and b of seedlings grown under the influence of *Ch. infusionum*-AnDI-76 strain it was found that the amount of chlorophylls was 1.84 mg/g (dry leaf basis) less than the control.

Also, the chlorophyll a content of the control variant was 0.41 mg/g compared to the chlorophyll a of the seedlings grown under the influence of the *B. braunii*-AnDI-115 strain, compared to the chlorophyll a of the seedlings grown under the influence of the *Ch. infusionum*-AnDI-76 strain. It was observed to be as high as 1.03 mg/g. According to the content of chlorophyll b, the control variant (6.82 mg/g) is significantly more than the strain *B. braunii*-AnDI-115 (9.34 mg/g), *Ch. infusionum*-AnDI-76 (6.42 mg/g) It was found that it showed a lower index than the /g) strain.

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