

Article

# Cystic yellow algae under different initial nitrogen levels special grease, tired, law

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**Abstract:** Cystic yellow algae with different initial Nitrogen Levels (Tribonema utriculosum sag 22.94) Oil content and fatty acid composition and content. Fruit, show, cystic yellow, algae in Nitrogen 3.0 mmol/L The highest biological degree 6.39 g/L; Nitrogen Content 18.0 mmol/L Fat and fatty acid content is the highest Cell dry weight 44.62% And 42.21%; The above 3A Refers to a body of rate were in nitrogen degree 3.0 mmol/L To the highest points 0.538, 0.209 And 0.206 g in L<sup>-1</sup>In D<sup>-1</sup>. In 4A Initial nitrogen of conditions under cystic yellow algae oil and fatty acid content can be with the nitrogen of increase and increase. Fatty Acid Content Analysis fruit showed algae of main fatty acid beans Acid (C14:0), Brown acid (C16:0), Palm oil acid (C16:1Omega7), Peanut four Acid (C20: 4 Omega 6) And eicosapentaenoic acid (C20:5Omega3EPA). Which brown oleic acid content highest accounted for fatty acid content 36.53%~50.08%. Study fruit show that cystic yellow algae in different initial nitrogen of conditions under has special of oil-tired law is a strain has important with price of oily microalgae. Off: Cystic yellow algae; Nitrogen; Fat; Fatty Acid

**Keywords:** tribonema utriculosum SAG22.94; KG concentration; total lipid; fatty acid

Biological fuel for has sustainable of, guaranteed cost and raw materials more of such as point Renewable Energy open use of research point. Microalgae and higher plant a can do it photosynthetic role fixed CO<sub>2</sub> Put O<sub>2</sub> And has Photosynthetic Efficiency High students speed fast oil content and carbohydrate compounds content high don't take up [1] Cultivated land and point so microalgae suitable for biological fuel of students' raw materials. But microalgae biological fuel of generation high cost can't [2] Foot city demand. Study shows that oil-rich algae strains, [3] Of training conditions and use aquatic microalgae biological and Oil [4].

Fat and methods can in certain degree on reduce cost. Culture Conditions of can effective promoting algae the life of change algae cell of biochemical into is improve students' efficiency effective of methods. Microalgae cell the life of need to right A element, light, PH, Temperature and degree and. Normal life situation under oil microalgae of oil content General cell dry weight 10%~30% But in a lack of or highlights such as forced conditions under its oil content can be to cell dry weight 60%~80% [5,6]. Benign algae strains and oil rate, biological yield and the of extraction rate have important relationship. Biological of charge is microalgae biological fuel students process of heavy [7,8].

To. At present about microalgae of study, main concentration in Chlorella (Chlorella spp.), Algae (Scenedesmus SPP.) And Duchenne algae (Dunaliella spp.) Such as cell microalgae in but some algae in training process don't to take and [9,10] vulnerable to native of if swallowed. And small yellow algae (*Tribonema minus*) Can in no flocculation. Conditions under line take yield up 98.69% and

algae of oil content ultra-cell dry weight is 50%. The strain has cell size, large algae, which can be very good against the original for swallowing food. Therefore, the microalgae are not easy to collect, and can resist the original and the swallowing of the product.

Nitrogen is one of the important nutrients in the Process of microalgae [12].

It is close to the synthesis of microalgae, intracellular nucleic acids and proteins. Under certain nitrogen forcing conditions, microalgae, lipid, carbohydrate, and high additive and with biological degrees, proteins, and Foster Nitrogen Deficiency, oil-rich algae (*Neochloris oleobundans*). The highest oil content, Cellular stem weighs 40% [14]. Wu [2] spotted that in algae (*Eustig-Matos Magnus* and *E. Polyphem*), the lipid content of the algae was higher than that of the total nitrogen, but with a decrease of biological degree. Studies have shown that in yellow algae (*Tribonema sp.*), the oil content of yellow and algae can increase with the increase of nitrogen content in a suitable nitrogen content range, their bioavailability and oil content reached the highest [16].

High bioavailability and high fat content are tired. In general, *Chlorella* and other microalgae can be rich in lipid under low nitrogen or nitrogen-free conditions, it reduces the degree of nitric acid, thus limiting the use of nitrogen in the control of microalgae lipids. And yellow, algae do not exist, one. Therefore, yellow algae and algae play an important role in the development of microalgae biofuels.

Yellow algae, totally 27 species, are widely distributed in freshwater. There are 16 seeds in China [17]. At present, most of the researches on yellow algae are based on the aspects of birth and management, but there is little use of the source. In this study, an ideal oil-like microalgae—Cystoid yellow algae (*Tribonema utriculosum* sag 22.94) is likely to nitric acid nitrogen source of differential interference poor micro-observation-algae cell oil droplet in Oil-formation, with phase of 18.0, 3.0, 1.0, 0 mmol/L. 4A Initial nitrogen of line training the purpose was to explore the different initial nitrogen of cystic yellow algae of students, fat and fatty acid into and content of influence reveal its oil tired of Law, rich people-microalgae biological line of microalgae biological fuel of students provide more of raw materials.

## **1. Material and methods**

### **1.1. Material**

Material cystic yellow algae in Germany, root University algae preservation in investment biological science technology investment and limited the company microalgae Biological Science and Technology Center algae room.

### **1.2. Methods**

#### **1.2.1 Algae cell of training**

To fresh water microalgae commonly used BG11 Medium Base Nano 3 Nitrogen Source, The 4A Initial nitrogen of points 18. 0,3.0,1.0,0 mmol/L. Yang don't of conditions cystic yellow algae line training. To 4.5 × 60 cm of columnar light Biological Anti-the container 700 mL Algae liquid into the rich in 2.0% CO<sub>2</sub>Of

Air holding incident light ( $300 \pm 10$ )  $\mu\text{mol m}^{-2} \text{s}^{-1}$  In S temperature ( $25 \pm 3$ ). Algae cell inoculation in number of initial biological degree ( $0.4 \pm 0.05$ ) g/L Co-culture 12 d Each nitrogen degree were placed 3 Times repeat.

### 1.2.2. Cell Shape observation and cell in oil light staining

Collection 18.0 mmol/L Nitrogen degree in training to the first 0,3,6,12 d of algae cell production Olympus Differential Interference Optical Micro-observation algae cell shape and light mercury lamp take light photos. The Nile red Light dye liquid algae cell in the oil line staining. Take Nile red 200 mg Dissolved in 10 ml DMSO In get Natural 20g/L Of Mother Liquor. Then DMSO Will the mother liquor dilute 1000 Times have

0.02g/L Of Nile red with liquid. Staining 1 mL of adding 10 mL Nile red with liquid 50 water bath Mechanism in 5 min. 1.2.3 Biological and nitrogen of Set will aperture 0.45  $\mu\text{m}$  Of GF-C™ Ultra-Membrane placed in 105 Constant temperature oven in Drying 12 h After into a vacuum dryer in dry mixture heavy (W1). Every 48 h take algae Liquid mL. The xian heng heavy of membrane in smoke then placed constant temperature oven in Drying 12 h Out after cooling to constant weight (W2).

The weight difference method a biological degree. Quality Assurance hidden in -80 [18] Refrigerator nitrogen of the country method line.

### 1.2.3. Fat content set

Get the algae gel to ion washing 2 Times after placed in cold dryer Drying 72 h Dry of algae powder preservation in 80 Refrigerator. Fat Content in the Organic soluble Extraction-Gravimetric Method Line [19]. Said take 70 mg Algae Powder placed have ban zi of glass centrifuge tube in join 2 mL Dimethyl-METHANOL SOLUTION

V:V = 1:9) 50 Water bath magnetic mix 3 H After placed centrifuge in 3000 r/min Centrifugal 5 min Will supernatant to move the glass vial in. Remaining algae slag join 4 mL B-N-hexyl Solution (V:V = 1:1) Ice bath magnetic mix 1.5 h

3000 r/min Centrifuga 15 min Will supernatant moved to the above of glass vial in. Join 4 mL Steamed water to with supernatant of glass bottle in static the points 12 h. The clear liquid placed nitrogen blowing in dry. After the fat with B Complex of moved to first weighing EP Tube (EP Tube of M1) Nitrogen blow dry after into a vacuum Constant Temperature Box Constant Weight 8 h of (M2). Using difference method a fat content. Fat Content Omega 1 (Accounted for algae powder dry of percentage)  $\text{Omega}1 = (M1 - M2) / \text{Algae Powder} \times 100\%$ .

### 1.2.4. Fatty acid analysis

Of methods line. Said take 10 mg Dry algae powder placed Brown 1.5 mL Of GC Products bottle each product said take 3 A heavy

2 Times. Products bottle of in turn join 200  $\mu\text{L}$  Of limitation-Methanol (V:V = 2:1), 25  $\mu\text{L}$  of C13:0-N-hexyl solution (C = 10g/L) and 300  $\mu\text{L}$  of Acid-methanol solution (V:V = 1:25). Mix well and place in 85 Oven 1 H. After cooling at room temperature, divide into each bottle and add 1 mL Zheng ji, Zhen Warm and quiet 1—4 h. To the new good 1.5, in the bottle, add 700  $\mu\text{L}$  He, and  $\mu\text{L}$  Supernatant, vibration seal after homogenization. To the above, 1.5 bottle added

5.µL. 1g/L. With Peak surface of General fatty acid composition and content were calculated.

### **1.2.5. Keywords: biological, lipid, fatty acid, rate, biological, lipid, fatty acid, rate, computing**

As follows: Rate= Dcw/T; Fat Body, Rate= Dcw \*Omega1/T;Fatty acid position, Rate = Dcw \* tfas/T. Type, DcwBio du(G/L); tfas Fatty Acid Content(%); TFoster(D).

### **1.2.7. Data, management**

By adopted Microsoft Excel 2012 and origin 8.5.1 Data processing, management, SPSS 17.0Component row difference, binding Analysis Level Alpha = 0.05.

## **2. Fruit and analysis**

### **2.1. Cystic yellow, algae, cell formation**

Research shows that (Nile red) It can be used for quick, sensitive and reliable in vivo Quantitative Determination of intracellular lipid in microalgae. Light color is related to factors such as shot wave and fat type, color range, from golden yellow to deep Color Range [22]. In the light, the grease often yellow under training 0,3,6D [23, 24]. Of cell oil droplet in Oil-clear can (1: C, D, E) and to training 12.D Oil fill the whole cell and with leaf body reduce (1: F). Study fruit show that algae cell 0~6d oil-tired phase slow and 6d after oil rapid increase.

### **2.2. Different nitrogen of cystic yellow algae the effects**

Of Nitrogen of the cystic yellow algae of Students Status Analysis Fruit showed Training12d. After the degree of biological degree have different degree of increase (2). In addition0 mmol/L Nitrogen of the other nitrogen degree of algae cell are in 2D after into number; To the first 6D Algae cell students rate start reduce the most into the plateau, which nitrogen degree is 3.0 mmol/L Biological degree in the whole training cycle in the highest, and in 6D difference ( $P < 0.05$ ) shows in biological degree, highest 6.39g/L. And 0,1.0,18.0 mmol/L nitrogen degree of the highest biological of 3.025,5.105,4.545g/L. Factors variance analysis fruit show that when training 12 d4A Initial nitrogen degree of biological degree were difference. ( $P < 0.05$ ). According to nitrogen consumption status shows that in 18.0 mmol/L Nitrogen degree. In the first 4d of nitrogen degree, it is fast decreasing, then flat growing. The most medium in nitrogen degree is 177 mg/L. And in 0,1.0 and 3.0 mmol/L nitrogen. In nitrogen, in the first 0,2,4d, it ran out. However, No.3 Period (Xu et al.), special oils and fats of algae with different initial Nitrogen Levels 415 Cystic yellow algae and cells can be produced in the medium without nitrogen.

They can use their own nitrogen to produce 35.08% and 34.16% relatively. Factors variance analysis fruit show that all. So, in addition, 18.0 mmol/L of Nitrogen (18.0 mmol/L) and other nitrogen deficiency degree of the highest.

Nitrogen degree of algae cell in 4d were in no nitrogen of training. Oil content

was different ( $P < 0.05$ ) and nitrogen deficiency was medium. Of the highest oil content differentiated in oil-rich.

### 2.3. Different Nitrogen of cystic yellow algae oil tired of influence new algae and fourtail algae (*Scenedesmus quadricauda*)

2.5 Different Nitrogen of cystic yellow algae a training body biological, fat and fatty acid rate of influence.

This study, 4A Initial nitrogen of conditions under cystic yellow on culture to the first 12 d 3.0 mmol/L Nitrogen degree of Students Of, fat and fatty acid a body rate was the highest points, 0.538, 0.209, 0.206 g in L<sup>-1</sup> In D<sup>-1</sup>. And its 3A of a body biological of rate size order sort 1.0 mmol/L > 18.0 mmol/L > 0 mmol/L Fat and fatty acid rate size order sort 18.0 mmol/L > 1.0 mmol/L > 0 mmol/L (5). Nature in there more-algae it belongs to different [27] Of such as algae, yellow algae and. Some-algae in spirulina (*Spirulina sp.*), protein content high and anti-dyeing and point wide [28] Pan-health care products and food line. Some-algae has good of nitrogen, phosphorus absorption ability commonly used in water management. [29] Liu Such. Study shows that when water of nitrogen and phosphorus than low hair algae (*Cladophora sp.*) Can effective assimilation phosphoric acid in phosphorus; And when water of nitrogen and phosphorus ratio Fishy algae (*Pseudanabaena sp.*) is effective absorption nitrate nitrogen [30].

Wang et al. Of study sheath algae (*Oedogonium sp.*) showed efficient use of water of nitrogen line. In addition-algae has been has added of biological active, [31] Chen Such. Study Habitat orange algae (*Trentepohlia arborum*) Cell containing big Of-Added Activity Of—Hu Bu. At present, domestic and foreign on oily microalgae of study phase less. This study cystic yellow algae is a strain very with price of oily microalgae has special of and oil performance can be used as oily microalgae of mode algae strains open use.

Is take algae cell ideal of methods for big mode life with the close efficiency often and algae cell of size was proportional relationship. Phase in Chlorella, micro-algae (*Nanno-chloropsis sp.*) Algae, cystic yellow, algae with large cell size, the algae, degree greater than most of the original (5.  $\mu\text{M}$ ~0.5) caterpillars and worms, which can be very good. The resistance to native, the swallowing of matter, and in the process, Sac Like yellow, algae, can use, some spirulina, harvest work. Nitrogen is the essential nutrient element of microalgae. In a suitable nitrogen level, nitrogen deficiency will cause the algae cell biology and protein content decreased, and with the increase of carbohydrate and lipid content. In this study 4. The results of the study show that the cystic yellow algae have a short life cycle and are in 3.0 mmol/L The biomass was higher under nitrogen condition. Especially in certain The content of lipid in algae varies with the nitrogen content.

Down two, glycerin, base, shift (Dialylglycerol yl-transferase) will be activated, is grease, tired off. Therefore, in a certain range of nitrogen, low nitrogen forcing can promote the increase of microalgae and intracellular lipid content. However, the control mechanism of Lipid accumulation in yellow, algae and cells under nitrogen-rich conditions needs further study. Keywords: Cystic yellow, algae, main fatty acids, beans, acid (C14:0) Brown acid (C16:0) Brown oil acid (C16:1.

Omega7) Peanut four, sour (C20:4. Omega6) And twenty carbon five acid C20:5. Omega 3., EPA), In which the brown oil acid (C16:1. Omega 7) is the highest content. With the increase of initial nitrogen content, algae, brown cells, oleic acid (C16:1. Omega7) And twenty carbon five acid (C20:5. Omega 3, [33] EPA) The content is also increasing. China, etc. Nitrogen deficiency may limit the synthesis of fatty acids, including EPAA series of fatty acid content decreased. Biodiesel from raw to fully burned, not in the process CO<sub>2</sub>. Of Emissions are typically colored fuels. The most common fatty acid A in biodiesel, including palmitic acid (C16:0) Stearic acid (C18:0) Oleic Acid (C18:1), Oleic acid (C18:2) And hemp Acid (C18:3) [34] And cystic yellow algae of fatty acid composition similar but algae of don't fatty acid content higher accounted for fatty acid 8%~53.0%. And fatty acids help to improve biological diesel of ignition of and Antioxidant [35] Of. High oil rate and fatty acid rate is decided to microalgae can [36] Line workers with of important quasi. The nitrogen forced the methods improve oil content will of biomass reduce out of oil of also phase low so oil content and can't direct [37] Mapping microalgae of oil efficiency. Study shows that in nitrogen sufficient conditions under yellow algae can high biological degree and high oil [16].

Of but this did not this like. They can belong to different kind of algae its characteristics their certain area. The Analysis shows that, 3.0 mmol/L Nitrogen of conditions under cystic yellow algae of biological, fat and fatty acid A rate were the highest. So, 3.0 mmol/L Nitrogen degree is cystic yellow algae to maximum biological, fat and fatty acid rate of best balance degree. More than fruit show that cystic yellow algae in different initial nitrogen of conditions under has unique of and oil-tired law is a strain for students' biological fuel of oily microalgae.

**Conflict of interest:** The author declares no conflict of interest.

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