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Araştırma Makalesi
Research Article

Calculatıonof Spırulına (*Spirulina platensis*) Productıon Chemıcal Ratıos by Devolopıng New Software

Emre YAVUZER[1*], Sertan AYTAÇ[1], Mebrure Nuket YAVUZER[2],

[1] Kaman Vocational School, Ahi Evran University, 40300, Kırşehir, TURKEY.
[2] Fisheries Faculty, Çukurova University, 01330, Adana, TURKEY.

*Corresponding Author Tel.: +90 535 965 31 58
E-mail: emreyavuzer@gmail.com

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Abstract

Spirulina is a microscopic alga that contains rich proteins, minerals, vitamins, essential amino acids and essential fatty acids like γ-linolenicacid (GLA). It is produced for diffrent industries such as food or medicine and sold as a natural supplementaround the world. In laboratory conditions lots of chemicals are using for production. The sechemicals are sodium bicarbonate, sodium carbonate, potassium phosphate, sodium nitrate, potassium sulphate, sodium chloride, magnesium sulphate, calcium chloride, iron sulphate and EDTA. As a result of the necessity of critical calculations of the sechemicals, there is a need to develop softw are for spirulina production which is one of the most important problems of thissector. Microsoft Visual Basic6 program wasused in writing a computer program to plan the daily work to be done, chemical calculations, laboratory conditions and to controlfin ancialaf fairs in Spirulina farm. Microsoft Access program was alsoused as a database. Insoftware, alga ponds, the amount of algasand planting date is firstly defined as computer data fromthe "Information Input" menu. Based on these definitions, the program can calculate the harvest of algas, chemical ratios for planting and cost of chemicals. The soft ware wastested by a bigspirulina farm in Adana of Turkey and seen that it can be use for anyone who wants to product Spirulina.

***Keywords*:** Micro alge, food supplement, biodiesel.

Öz

Spırulına (Spirulina Platensis) Kimyasal Oranlarını Hesaplamak İçin Yeni Bir Bilgisayar Yazılımı Geliştirilmesi

Spirulina protein, mineraller, esansiyel aminoasitler ve γ-linolenikasit (GLA) gibi yağ asitlerince zengin içeriğe sahip mikroskobik bir alg türüdür. Gıda ya da ilaç gibi farklı endüstriler için doğal bir takviye olarak dünya çapında üretimi yapılmaktadır. Laboratuvar koşullarında üretimi için birçok kimyasala gereksinim duyulmaktadır. Bu kimyasallar, sodyum bikarbonat, sodyum karbonat, potasyum fosfat, sodyum nitrat, potasyum sülfat, sodyum klorid, magnezyum sülfat, kalsiyum klorid, demir sülfat ve EDTA dır. Bu kimyasalların kritik hesaplamalarının yapılabilmesi gerekliliğinden dolayı Spirulina Üretim Yazılımına ihtiyaç duyulmuştur. Spirulina tesisindeki günlük işlerin planlanması, kimyasal oranlarının hesaplanması, laboratuvar şartlarının ve finansal faaliyetlerin kontrol edilebilmesi için Microsoft Visual Basic 6 programı, database olarak ta Microsoft Access programı kullanılmıştır. Yazılımda alg havuzları, alg oranları ve hasat zamanları ilk olarak "Giriş Menüsü" ile sisteme tanımlanmaktadır. Bu tanımlamalara göre yazılım alg hasadı, ekim yapılacak kimyasal oranları ve kimyasal hesaplamalarını yapabilecektir. Yazılım Adana/Türkiye'de bir Spirulina çiftliğinde test edilmiş ve Spirulina üretimi yapmak isteyen herkes tarafından kullanabileceği görülmüştür.

Anahtar Kelimeler: Mikro alg, gıda takviyesi, biyodizel.

Introduction

Spirulina platensis is a blue-green alga (Cyanobacterium, family Oscillatoriaceae) and the only blue-green alga commercially cultivated for fooduse (Gad *et all.,* 2011). In 1996, the United Nations World Health Organization (UN WHO) declared Spirulina as 'The best for tomorrow', and it has been popular in recent years as a food supplement (Simpore vd., 2006). It has become popular for being a source of long-chain unsaturated fatty acids, proteins and pigments such as phycocyanin, chlorophyll, lutein and carotenes (Leema *et all.,* 2010). *S. platensis* is rich with various minerals and vitamins (Cohen vd.,1987). Also it has biodiesel production potential for energy science (Moazami *et all.,* 2012). Sundry studies have reported that *Spirulina* can inhibit cancers in animals (Gad et all., 2011: Mohan et all., 2006: Roy et all., 2007) and some in vitro and animal studies have committed that *Spirulina* has some antiviral effects (Shih *et all.,* 2003). On the other hand *Spirulina* has powerful effects against many toxi cants (Sharma *et all.,* 2007) The use of computer software is extremely important for food and other industry. Computer software are also used as an auxiliary equipment since it eliminates various types of errors occurred as a result of man-made (Yavuzer *et all.,* 2012). People must use sophisticated computer software. It is known that businesses that do not use computer software often make many mistake especially critical calculations. There fore, most businesses will focus on to use software industry which is suitable for their work. For many use of *Spirulina* alga and its high prices, people wants to product *Spirulina* in culture conditions but they don't know how to product it and one of the biggest problems of the *Spirulina* production is calculating the chemical ratios for planting amount. As a result of the necessity of critical calculations in *Spirulina* production, there is a need to develop software for *Spirulina* farms and entrepreneurs.

Materials and Methods

Microsoft Visual Basic 6 program was used in writing the computer program and Microsoft Access program was used as a database. In software, ponds, laboratory and other parameters (such as information of employees, chemical firms, chemical unit prices and costumer) is firstly defined as computer data from the "Information Input" menu. Based on these definitions, the program has a data for other menus and it can calculate many things as amount of unit prices or table of financial analysis. It is possible to see the works in spirulina farm daily, weekly, monthly and yearly at the beginning of the software.

At any time, the calculation of chemical ratios, laboratory conditions, remained chemical inventory, the control of personnel and companies that product is sold, and the calculation of current move such as buying and selling is also made by program.

Results

Spiruilna Production Software;
Ponds In formation Input;

The datasuch as the pondno, plant date, responsible personnel and planted amount of farm provide to keep business records and to perform the software makingcal culations by using the enteredin formation. Figure 1 show sinter face of software in ponds in formation input.

Chemical In take Process;

Figure 2 shows the chemical intake process screen. It in forms the user or farm about where chemical is provided, amount and price of chemical. There fore, it is recorded the dates of chemical taken and can be calculated chemical stock situation. It also shows unit costs of the chemicals. User can report the data andex port to excel.

Chemical Ratios Calculation;

In this menu, user can calculate the chemical ratios for planting amounts. Figure 3 shows the calculated ratios for 1000 liters.

Cost Calculation Menu;

This menu displays the planted spirulina'scost. User can only write the planting amount and software quickly calculate all chemical'sunit and also total costs. Figure 4 shows the calculated costfor 1000 liters.

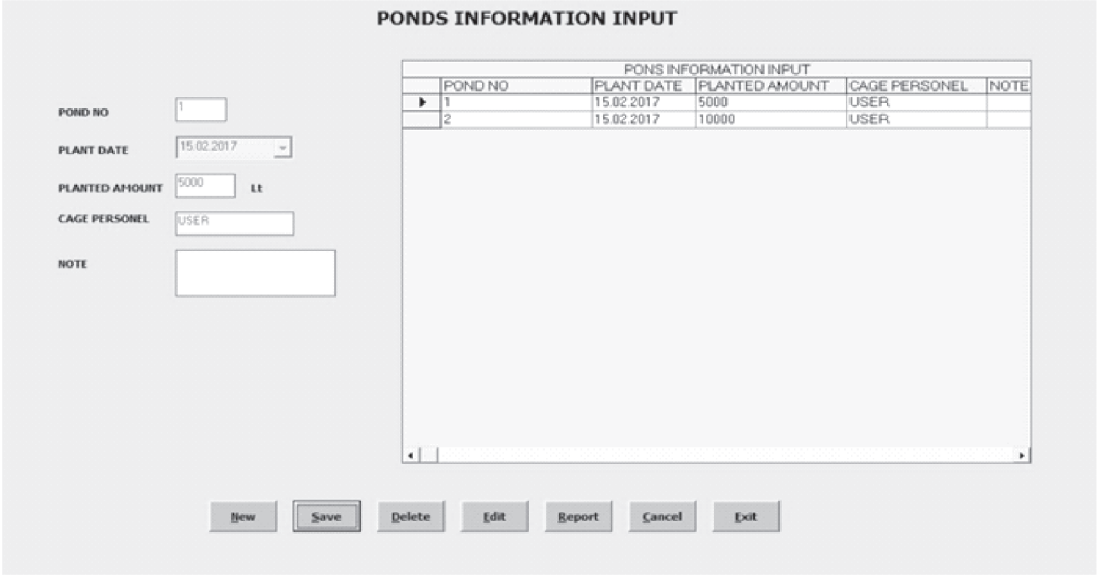

Figure 1. Screen for ponds information input.

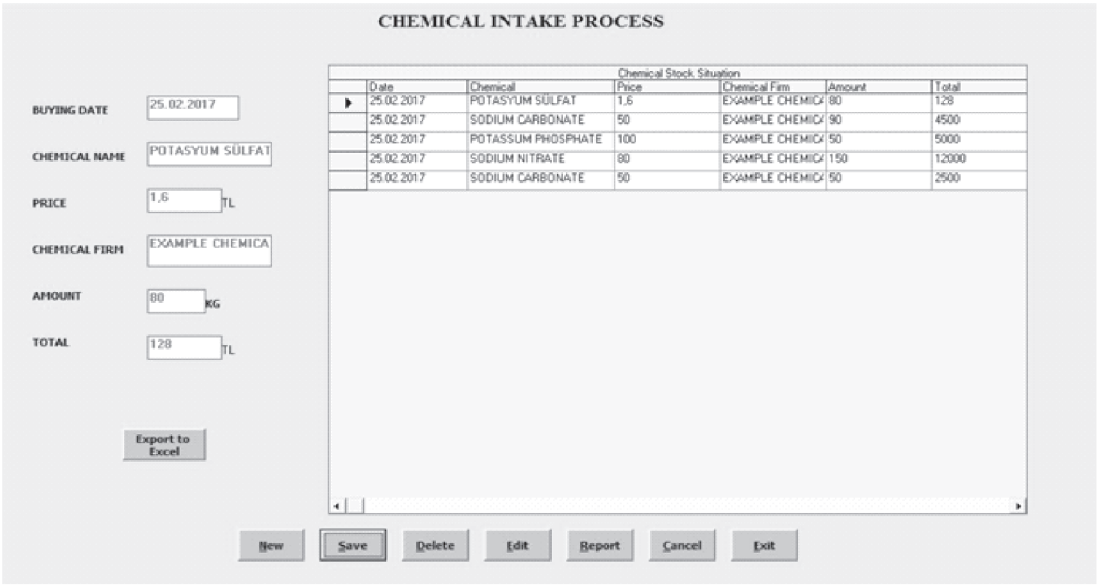

Figure 2. Chemical intake process.

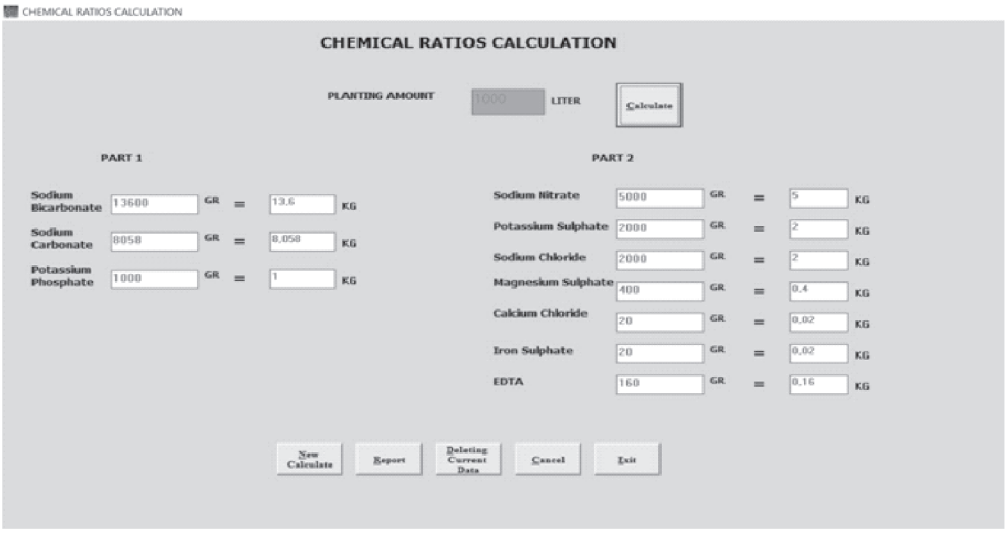

Figure 3. Chemical Ratios Calculation.

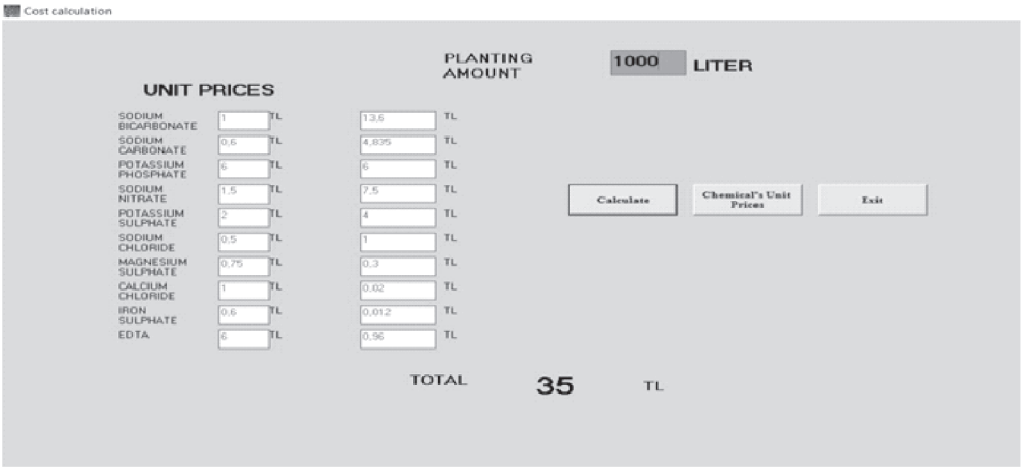

Figure 4. Cost Calculation Menu.

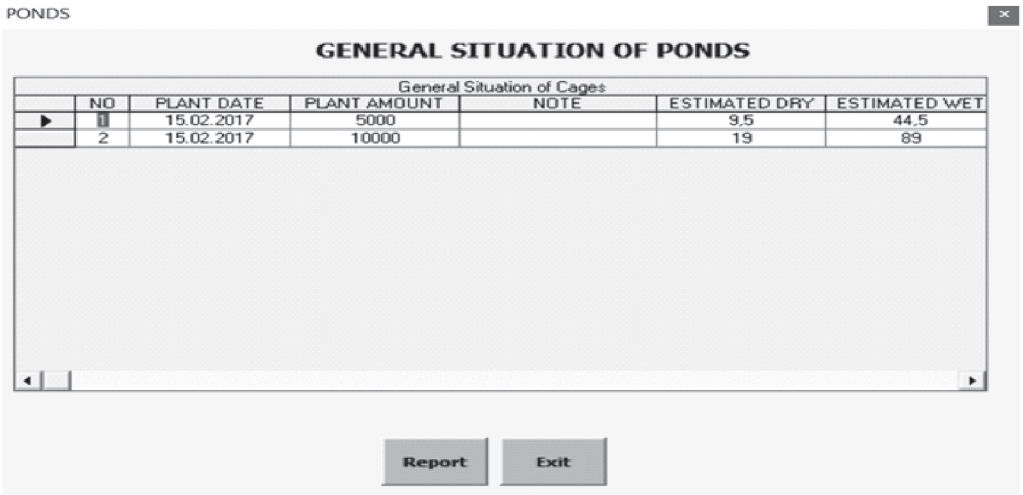

Figure 5. General Situation of Ponds.

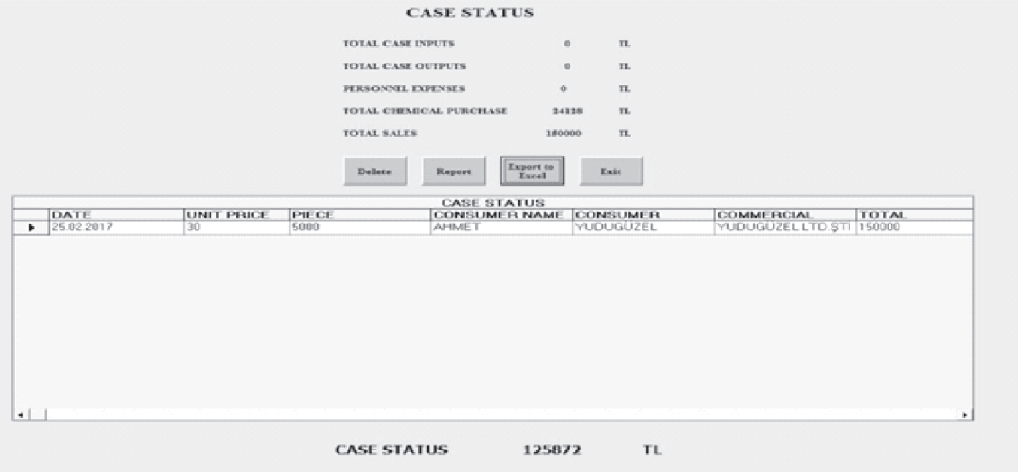

Figure 6. Case Status.

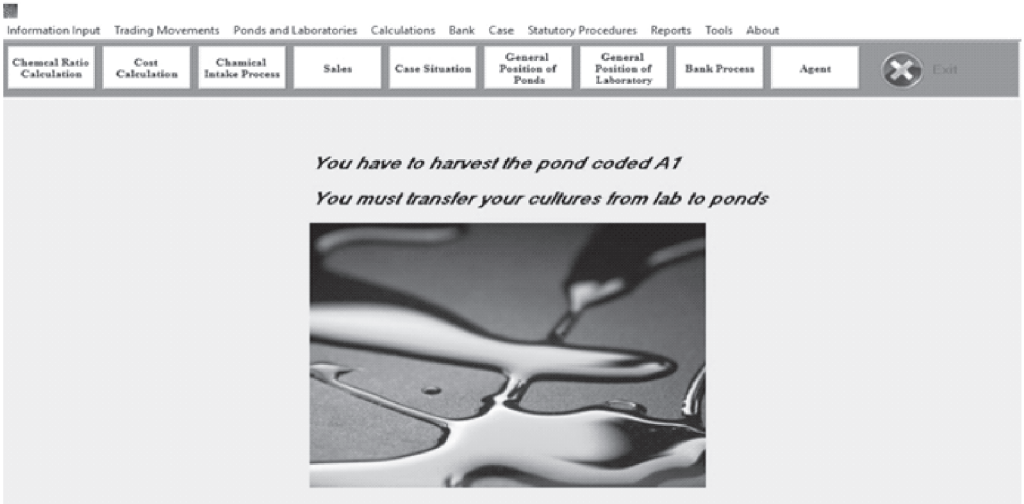

Figure 7. Reporting daily work to be done.

General Situation of Ponds;

Figure 5 shows the general situation of ponds screen.The menu can be used for quickly look at the ponds and see the data slikeplant date, plant amount, estimated dry spirulina and estimated wet spirulina.

Case Status;

The menu is important to follow income and outcome of spirulina farm. For this purpose, it is important in determining the profitability of the business with the creation of financial analysis reports. Alga sales, cost of personnel and chemical, transactions, checks, promissory notes are also controlled by user in this menu. Figure 6 shows the case status screen.

Reporting Daily Work to be Done;

Figure 7 shows the reporting daily work to be done. The user is alerted in the main screen at the time of harvesting of alges in pondsor transfer cultures from laboratory to ponds. Clicking on any warning alert in forms the user can see the details.

In conclusions, thanks to this software, spirulina farms will be control the necessary data for businesses. The software was tested by

a big spirulina farm in Adana of Turkey and seen that it can be use for anyone who wants to product spirulina. Except this even some one who does not know anything about spirulina production can be a spirulina producer.

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