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ENVIRONMENT-FRIENDLY BIOMATERIAL (RICE STRAW EXTRACT) FOR CONTROLLING THE CYANOBACTERIUM *MICROCYSTIS AERUGINOSA* IN NATURAL WATER IN ABBASSA AND RYAN WATER IN EGYPT

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Abstract

Rice straws which are otherwise an agricultural waste product and the burning of straw causing the black cloud in Delta Egypt may be an environmentally friendly and sustainable source of a bioalgicide. The algicidal effects of the rice straw extract on the growth of *Microcystis aeruginosa* were investigated using cultured two isolate RYAN isolate and CLAR isolate in specific media and natural water (CLAR pond water, RYAN pond water and RYAN lake water) the experiment carried out at plankton room temperature 26+2 with 14 h:10 h light dark photo period . The growth of *Microcystis aeruginosa* was inhibited by rice straw extract concentrations at 0.1, 0.5, 2.5, and 12.5 mg^{-1} in specific media and inhibited at concentration 0.1, and 0.5 in natural water. All four treatment concentrations of the rice straw extract, the number of *M.* aeruginosa cells was significantly reduced during the 10-day test period ($P < 0.05$). The growth inhibition of *M.* aeruginosa with 12.5 mg l^{-1} of the rice straw extract was higher than that with the other extract concentrations in two isolate. No significant difference was found between the other treatment concentrations. Three natural water from two field ponds and the Rayan Lake were used to test the algal growth inhibition over a period of 10 days. The reduction growth of *Microcystis aeruginosa* was increase with time of experiment increase, it was more than 70% from control. The results suggest that the rice straw extract may serve as environmentally friendly agents for controlling the growth of toxic Microcystis *aeruginosa* in natural water.

Keywords: *Microcystis aeruginosa* ; Rice Straw extract ; natural water ; algicides .

INTRODUCTION

In recent years, there has been an apparent increase in the occurrence of harmful algal blooms occurring in potable waters. *Microcystis aeruginosa* is the most common species of bloom causing cyanobacteria. Many strains of Microcystis are known to produce cyanobacterial hepatotoxins termed microcystins (Oh *et al*., 2000; Yasuno *et al*., 2000). These toxins, which are soluble peptides, damage the livers of higher animals (Codd and Poon, 1988; Watanabe *et al*., 1989) and are lethal or harmful to many kinds of aquatic organisms (Penaloza *et al*., 1990). Therefore, control of microcystin-producing Microcystis is an important environmental and public health issue. Various chemical or synthetic agents (e.g., copper, chlorine, aluminum, calcium, and potassium

permanganate) are used to control nuisance phytoplankton and weeds in aquatic ecosystems. However, these algicides often induce secondary pollution such as the release of phytotoxins, which threaten drinking water supplies, persist in the environment, and are toxic to fish (Lam *et al*., 1995; Karan *et al*., 1998; Boyd and Massaut, 1999; Meepagala *et al*., 2005). In recent efforts to control toxic bloom-forming Microcystis, algicides from natural biomaterials have received attention as alternatives to chemical agents. Such algicides are likely to be specific and biodegradable, and may therefore offer an environmentally friendly method for control of algal blooms (Park *et al*., 2006a,b) Furthermore, the growth of *M. aeruginosa* is inhibited by L- 2-azetidinecarboxylic acid from Polygonatum odoratum var. pluriflorum (Kim *et al*., 2006), salicylic acid from rice straw (Park *et al*., 2006a), tannic acid from oak extracts (Park *et al*., 2006b), and several compounds isolated from rice hulls (Chung *et al*., 2007). However, these studies used unicellular *M. aeruginosa* strains. We think that it is important to test the effects of natural algicides on problematic colonial *M. aeruginosa*. Extracts from rice hulls have recently been found to have herbicidal and algicidal effects (Ahn, & Chung 2000; Chung *et al*., 2007). Rice hull is the major by-product of Thus, rice hulls, which are otherwise an agricultural waste product, may be an environmentally friendly and sustainable source of a bioalgicide. The allelopathic activity of plants, such as rice straw, has already been documented, and phenolic compounds invariably identified as the allelopathic or phytotoxic substances (Rice 1984; Inderjit *et al*. 1995; Chung *et al*. 2001). Extensive research has also been conducted on the effect of allelopathic plants on microalgae, as regards inhibiting algal bloom in the field and laboratory (Gibson *et al*. 1990; Welch *et al*. 1990; Barrett *et al*. 1996; Ridge and Pillinger 1996; Nakai *et al*. 2000; Ball *et al*. 2001). For example, a barley straw extract was found to effectively inhibit the growth of several planktonic and filamentous algae in the laboratory and reservoirs (Gibson *et al*. 1990; Barrett *et al*. 1996). The allelochemicals released from barley and rice straw limit the germination, growth, photosynthesis, respiration and metabolism of other plants, and consist of phenolic compounds, such as p-hydroxybenzoic, p-coumaric, ferulic, vanillic, salicylic, syringic and benzoic acid (Rice 1984; Inderjit *et al*. 1995; Chung *et al*. 2001). Thus, the phenolic compounds in rice straw may inhibit the growth of the cyanobacterium Microcystis aeruginosa. Many kinds of chemical agent or synthetic compound, including copper, chlorine, aluminium, calcium and potassium permanganate, are currently used to control phytoplankton and aquatic weeds in lakes, reservoirs and ponds. However, chemical algicides such as copper sulfate exhibited toxic effects on fish (Karan *et al*. 1998). They also can induce secondary pollution, by releasing phytotoxins that increase potential health risks in drinking water supplies (Lam *et al*.

1995). Therefore, in the context of controlling algal blooms, the use of rice straw may be an alternative way to minimize economic costs and use sustainable material from agricultural waste (Chung *et al.* 2001).

MATERIALS AND METHODS

Algal strain and culture conditions

The cyanobacterium *M. aeruginosa* ((RAYAN isolate) and (CLAR isolate) were isolated in specific media (Allen medium) from Ryan lake water and the CLAR water pond at The Central Lab For Aquaculture Research in Abbassa. .The algal isolate was grown in an Allen medium (Allen 1968), maintained at 28^{O}C on a 14 h: 10 h LD cycle in a shaking incubator, and illuminated at 100 umol photons m^{-2} s^{-1} by cool-white fluorescent lamps for 2 weeks. The composition of the Allen medium was (in mg) 1500 $NaNO_3$, 39 K_2HPO_4, 75 $MgSO_4$-7H2O, 21 Na_2CO_3, 27 $CaCl_2$, 58 Na_2SiO_3, 9H2O, 1 EDTA, 6 citric acid, 6 ferric citrate, 2, 86 H3BO3, 1.81 MnCl2, $4H_2O$, 0.22 $ZnSO_4$-$7H_2O$, 0.39 Na_2MoO_4, $2H_2O$, 0.08 $CuSO_4.5H_2O$, and 0.05 $Co(NO_3)_2$, $6H_2O$ in 1000 ml of distilled water. The pH of the medium was adjusted to 7.8. For the seed culture, 10 ml of the culture was transferred to a 250-ml culture flask with a fresh 90 ml of the Allen medium.

Extraction of rice straw

The rice straw were obtained from private farm in Wady Almolak Abou Hamad Sharkia , cut into uniform lengths (2 cm), and crushed. The extract was then obtained using the modified method of Suzuki *et al.* (1998). The straw strips (100 g) were mixed with methanol (1500 ml) and sonicated for 10 min at 50°C. The solution was then filtered through glass fiber paper (Whatman GF/C) and evaporated. The resulting extract was concentrated to 1% (dry weight basis) and stored in a freezer (-10^{O}C) until required

Growth inhibition by Rice Straw extract

All the *M. aeruginosa* growth inhibition experiments were carried out at room temperature (26 ± 2 ^{O}C) with a 14 h: 10 h LD photo period. To examine the effect of different concentrations of the rice straw extract on the cyanobacterium, *M. aeruginosa* was cultivated in specific media, Allen media treated with 0.1, 0.5, 2.5 and 12.5 mg l^{-1} of the rice straw extract compared with control (without rice straw). The number of *M. aeruginosa* cells was enumerated at 2-day intervals using Quantitative estimation of *M. aeruginosa* cells , 1 ml was drawn and placed into Sedgwick-Rafter cell, and then it was microscopically examined for counting the colony and count the average number of cells in the colony , APHA (19 85). The results were then expressed as cell counts ml^{-1}, to determine any changes in the cell density over 10 days. Meanwhile, to understand the effect of

rice straw extract inhibition on the cyanobacterium, *M. aeruginosa* (CLAR and RYAN isolate) were cultured in three kinds of natural water from two ponds; one from CLAR pond and other from Ryan pond naturally infected by Microcysties aeuriginosa and the third from the Ryan lake water) and its growth compared when using 0.1 and 0.5 mg l^{-1}, four replicates for each treatment compared with the control from three kinds of naturally

Sterilization of fish pond water

Sterilized fish natural water, naturally infected with *Microcystis* by adding 3 ml/l Chlorox (common household bleach, 5.25% chlorine) to the water for 24 hour can be neutralized by adding sodium thiosulfate 1% concentration (use 1.1 ml/10L) *Connell, G.F.* (1996). Analyses of pH, N, P, alkalinity, hardness, and Ammonia were carried at the start and end of experiments.

LC_{50} for tested the toxicity of *Microcystis* by serial dilution from *Microcystis* 10^1, 10^2, 10^3, 10^4, 10^5, 10^6, 10^8, 10^{10}cells/ml ten fish *Oreochromis niloticus* average size 2.51 ± 0.26 in aquarium contain 50 liters sterilized water fish pond for 96 hours.

Experimental design

Twenty Flasks were filled with 0.25 L of sterilized Allen media , and four Flasks were assigned for each treatment. Rice straw extract was added from the stock solution at four concentrations 0.1, 0.5, 2.5 and 12.5 mg/l supplemented by *Microcystis aeruginosa* (10^4 cells/ml).

The second experiment

Twelve carboys were filled with 10 L from natural water from CLAR pond water and four carboy were assigned for each treatment (0.1, 0.5 mg/l-1 rice straw extract) and four as control (without rice straw extract) all carboys supplemented by *Microcystis aeruginosa* (10^4 cells/ml) and repeated this experiment with the two natural water (RYAN pond water and RYAN Lake water)

Data analysis

The reduction growth was calculated using the modified equation

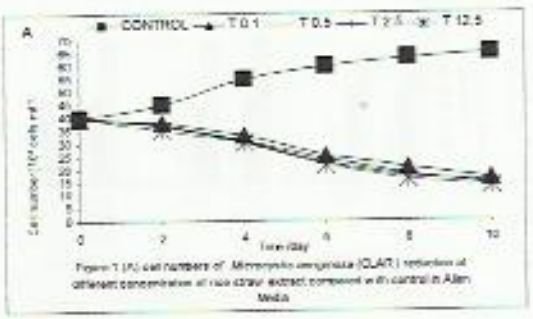
$$\text{Reduction growth \%} = \frac{\text{Control} - \text{Treatment}}{\text{Control}} \times 100$$

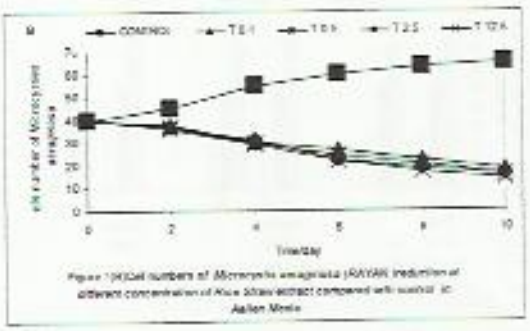
The difference in the cell densities between the treated and control culture was analyzed using an analysis of variance (ANOVA) and the data compared using linear contrasts. A P-value of < 0.05 was considered significant. All statistics were run on the computer, using the SAS program (SAS, 2003)

RESULTS

Growth inhibition of M. aeruginosa by rice straw extract

The inhibitory effect of the rice straw extract was quite distinct compared with the control Fig. 1 (A&B).





For all four treatment concentrations of the rice straw extract, the number of *M. aeruginosa* cells was significantly reduced during the 10-day test period ($P < 0.05$). The growth inhibition of *M. aeruginosa* with 12.5 mg l-1 of the rice straw extract was higher than that with the other extract concentrations in two isolates (RYAN and CLAR). No significant difference was found between the other treatment concentrations. Three natural water from two field ponds and the Rayan Lake were used to test the algal growth inhibition over a period of 10 days. In the medium from CLAR pond (NO_3 -N, 0.16 + 0.02 mg/l; P, 1.2 ± 0.3 mg/l, pH, 8.2 ± 0.3, hardness 226 + 14mg/l, Alkalinity 220 ± 12 mg/l cells with 0.5 mg/ l of extracts were similar to those with 0.1 mg/ l of the regular extract until day 7, at which point, reduced cell numbers were noted until day 10 Fig. 2 (A&B).

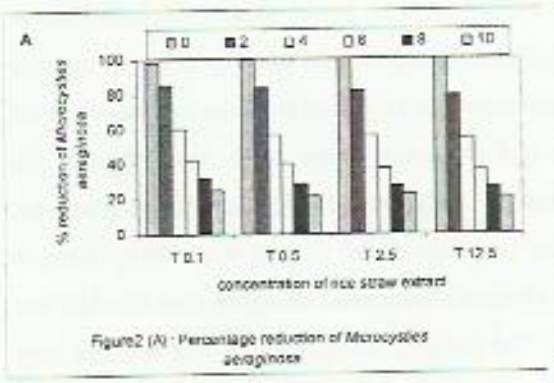


Figure2 (A) : Percentage reduction of Microcystis aeruginosa

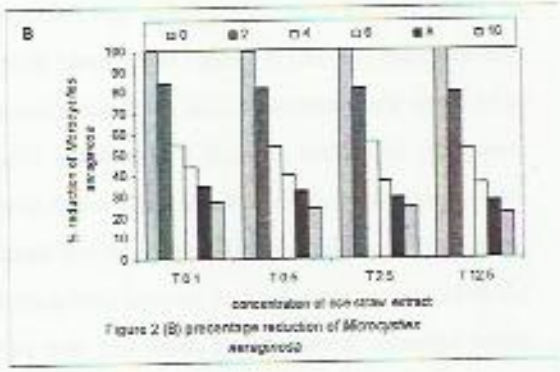
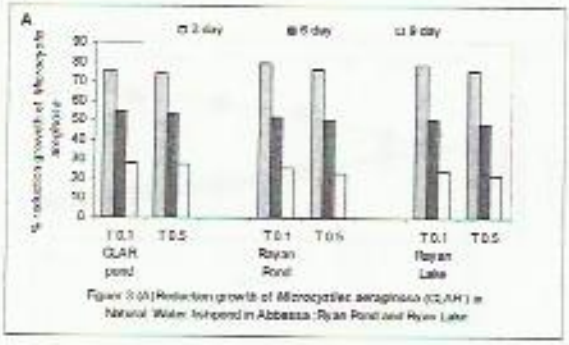
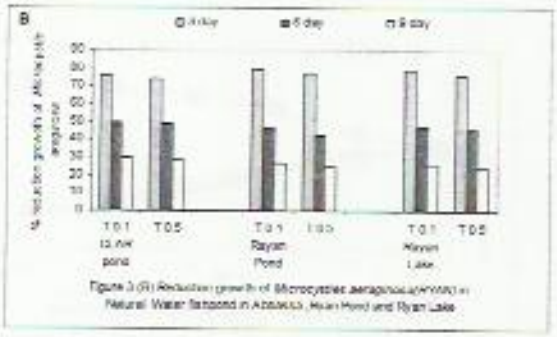


Figure 2 (B) percentage reduction of Microcystis aeruginosa

No difference was found between the groups treated with the two concentration of rice extracts., while a relatively higher reduction was observed in Ryan pond (NO_3 -N, 0.12 + 0.03 mg/l ; P, 0.11 ± 0.03 mg/l pH,8.5 + 0.3,hardness 320 ± 30mg/l, Alkalinity 200 + 12 mg/,and Ryan lake water (NO_3

-N, 0.01 ± 0.002 mg/l ; P, 0.03 ± 0.01 mg/l, pH.8.5, hardness 340mg/l, Alkalinity 220 mg/l media . Fig. 3 (A&B).





The growth inhibition effect of the rice straw extract was much higher on day 9 than on day 3 and 6. Therefore, it seemed that the combination of N and P concentrations in water and the period of treatment had an affect on the allelopathic activity of the rice straw extract on *M. aeruginosa*.

DISCUSSION

It was clearly demonstrated that the rice straw extract effectively inhibited the growth of *M. aeruginosa* in specific media and natural water. The number of *M. aeruginosa* cells significantly decreased with all treatments relative to the control. The results obtained were similar to those previously found when using barley straw for various test microalgae (Gibson *et al.* 1990; Welch *et al.* 1990; Barrett *et al.* 1996; Ridge and Pillinger 1996; Ball *et al.* 2001). In addition, both the two concentration 0.5 and 0.1 mg/l rice extract also effectively reduced the number of *M. aeruginosa* cells in the three natural media, suggesting that allelochemicals released from the rice straw extract were able to diffuse through a membrane filter and minimally destroyed by heat. Most of the allelochemicals in rice straw are well known as phenolic compounds, i.e. ferulic, p-hydroxybenzoic, p-coumaric, vanillic, salicylic, syringic and benzoic acid (Rice 1984; Inderjit *et al.* 1995; Chung *et al.* 2001). In previous studies, several allelopathic chemicals have been identified from rice leaf and straw extracts, decomposing straw and rice soil. The phenolic compounds in rice are also very similar to those in barley (Inderjit *et al.* 1995). The release of phenolic compounds, such as ferulic acid and p-hydroxybenzoic acid from the decomposition of barley straw cell walls and low molecular weight aromatic compounds from the incomplete decomposition of lignin, has already been found to play a crucial role in the inhibition of algae (Inderjit *et al.* 1995; Ridge and Pillinger

1996). However, in the present study, the growth responses of *M. aeruginosa* to the allelochemicals included both inhibition and stimulation. Growth was significantly inhibited with the addition of salicylic acid, while the other six allelochemicals were able to inhibit or weakly stimulate the algal growth depending on their concentration .Tillberg (1970) found that salicylic acid at concentrations of 10^{-6} –10^{-3} mol l^{-1} (0.138–138 mg l^{-1}) decreased the phosphorus uptake of the alga Scenedesmus. Meanwhile, Scharff and Perry (1976) reported that under anaerobic conditions, at a low pH and 30°C, yeast lost K^+ ions in the presence of salicylic acid and glucose utilization was inhibited. Thus, they concluded that a fundamental action of this compound in many organisms was to reduce the K^+ content in the cells. The growth of *M. aeruginosa* was decreased significantly by 70% and 80% relative to the control with 0. 1 and 0.5 mg l^{-1} of the rice straw extract, respectively ($P < 0.05$). However, in the pervious studies each individual allelochemical only exhibited a low growth inhibition (0–26%) compared with the rice straw extract when added at concentrations of 0.01 and 0.1 mg l^{-1}. Dedonder and Van Sumere (1971) previously demonstrated that almost 40 phenolics effectively inhibited the growth of the green alga *Chlorella vulgaris*, due to the enhanced respiration of phenolics, including the uptake of oxygen. Meanwhile, Rice *et al.* (1980) demonstrated that five phenolic inhibitors (ferulic, p-hydroxybenzoic, p-coumaric, o-hydroxyphenylacetic and vanillic acid) from the decomposition of rice straw inhibited the growth and nitrogen fixation of Anabaena cylindrica. In particular, they reported that a combination of all five compounds was more effective in inhibiting the growth and nitrogen fixation, indicating a synergistic effect. This is especially important, as the five compounds always occur together in rice residue decomposition (Rice 1984). In addition, many researchers showed that a combination of three phenolics (p-coumaric, salicylic and benzoic acid) at a final concentration of 0.01 mg l^{-1} produced a higher growth inhibition (66%) than each individual phenolic at the same concentration, indicating that the presence of many allelochemicals at low concentrations in rice straw probably promotes a high synergistic, agree with our results where the reduction growth were more than 75% from the control

In conclusion, *M. aeruginosa* was effectively inhibited with a low concentration (0. 1 mg l^{-1}) of a rice straw extract. Moreover, the inhibitory activity of the rice straw extract on *M. aeruginosa* was likely due to the synergistic effect of various phenolic compounds in previous studies. Consequently, these results indicating that a rice straw extract can inhibit the growth of the microcystin-producing cyanobacterium *M. aeruginosa* have an additional significance as a factor that could reduce the health threat posed by cyanobacterial blooms. Thus, future studies will test the anti-algal effect of the rice straw extract in the field and other organisms, like zooplankton and fish.

REFERENCES

1- Ahn, J. K. and I. M. Chung. 2000. Allelopathic potential of rice hulls on germination and seedling growth of barnyard grass. Agron J 92, 11621167.

2- Allen, M. M. 1968. Simple conditions for the growth of unicellular blue- green algae on plates. J Phycol 4, 1–4.

3- APHA. 1985. Standard Methods for the Examination of Water and Wastewater, 16th ed. American Public Health Association, Washington, DC, USA.

4- Ball, A. S., M. Williams, D. Vincent and J. Robinson. 2001. Algal growth control by a barley extract. Bioresour Technol 77, 177–181.

5- Barrett, P. R. F., J. C. Curnow and J. W. Littlejohn. 1996. The control of diatom and cyanobacterial blooms in reservoirs using barley straw. Hydrobiologia 340, 307–311.

6- Boyd, C. E. and L. Massaut, 1999. Risks associated with the use of chemicals in pond aquaculture. Aquacult. Eng. 20, 113–132.

7- Chung, I. M., M. Ali, A. Ahmad, S. C. Chun, J. T. Kim, S. Sultana, J. S. Kim, S. K. Min and B. R. Seo. 2007. Steroidal constituents of rice (*Oryza sativa*) hulls with algicidal and herbicidal activity against blue-green algae and duckweed. Phytochem. Anal. 18, 133–145.

8- Chung, I. .M., J. K. Ahn and S. J. Yun. 2001. Assessment of allelopathic potential of barnyard grass (*Echinochloa crus-galli*) on rice (*Oryza sativa* L.) Cultivars. Crop Prot 20, 921–928.

9- Codd, G. A. and G. K. Poon. 1988. Cyanobacterial toxins. In Biochemistry of the Algae and Cyanobacteria ed. Rogers, L.J. and Gallon, J.R. pp. 283–296. Oxford, UK: Clarendon Press.

10- - Connell, G. F. 1996. The chlorination/chloramination handbook. Denver: American Water Works Association

11- Dedonder, A. and Van C.F. Sumere. 1971. The effect of phenolics and related compounds on the growth and respiration of *Chlorella vulgaris*. Z. Pflanzenphysiol 65, 70–80.

12- Gibson, M. T., I. M. Welch, P. R. F. Barrett and I. Ridge. 1990. Barley straw as an inhibitor of algal growth II: laboratory studies. J Appl Phycol 2, 241– 248.

13- Inderjit, Dakshini, K.M.M. and F. A. Einhellig.1995. Allelopathy: Organisms, Processes and Applications. ACS Symposium Series. Washington, DC: American Chemical Society.

14- Karan, V., Vitorovic´, S. V. Tutundzic and V. Poleksic. 1998. Functional enzymes activity and gill histology of carp after copper sulfate exposure and recovery. Ecotoxicol Environ Saf 40, 49–55.

15- Kim, J. S., J. C. Kim, S. Lee, B. H. Lee and K. Y. Cho. 2006. Biological activity of L-2-azetidinecarboxylic acid, isolated from *Polygonatum odoratum* var. pluriflorum, against several algae. Aquat. Bot. 85, 1–6.

16-Lam, A. K.Y., E. E. Prepas, D. Spink and S. E. Hrudey. 1995. Chemical control of hepatotoxic phytoplankton blooms: implications for human health. Water Res 29, 1845–1854.

17- Meepagala, K. M., K. K. Schrader, D. E. Wedge and S. O. Duke. 2005. Algicidal and antifungal compounds from the roots of *Ruta graveolens* and synthesis of their analogs. Phytochemistry 66, 2689–2695

18- Nakai, S. Y. Inoue, M. Hosomi and A. Murakami. 2000. Myriophyllum spicatum-released allelopathic polyphenols inhibiting growth of blue-green algae *Microcystis aeruginosa*. Water Res 34, 3026–3032.

19- Oh, H. M., S. J. Lee, M. H Jang and B. D. Yoon. 2000. Microcystin production by *Microcystis aeruginosa* in a phosphorus-limited chemostat. Appl Environ Microbiol 66, 176–179.

20- Park, M. H., M. S. Han, C.Y. Ahn, H. S. Kim, B. D. Yoon, and H. M. Oh. 2006a. Growth inhibition of bloom-forming cyanobacterium *Microcystis aeruginosa* by rice straw extract. Lett. Appl. Microbiol. 43, 307–312.

21- Park, M. H., S. J. Hwang, C.Y. Ahn, B. H. Kim and H. M. Oh. 2006b. Screening of seventeen oak extracts for the growth inhibition of the cyanobacterium *Microcystis aeruginosa* Ku¨tz. em. Elenkin. Bull. Environ. Contam. Toxicol. 77, 9–14.

22- Penaloza, R., M. I. Rojas, Vila, and F. Zambrano. 1990. Toxicity of a soluble peptide from Microcystis sp. to zooplankton and fish. Freshwater Biol 24, 233–240.

23- Rice, E. L. 1984. Allelopathy, 2nd edn. Orlando, FL: Academic Press.

24- Rice, E. L., C.Y. Lin and C.Y. Huang. 1980. Effects of decaying rice straw on growth and nitrogen fixation of a bluegreen alga. Bot Bull Acad Sin 21, 111–117.

25- Ridge, I. and J. M. Pillinger. 1996 Towards understanding the nature of algal inhibitors from barley straw. Hydrobiologia 340, 301–305.

26- SAS Institute 2003. SAS/STAT Guide for Personal Computers, 6th ed. Cary, NC.

27- Scharff, T. G. and A.C. Perry. 1976. The effects of salicylic acid on metabolism and potassium ion content in yeast. Proc Soc Exp Biol Med 151, 72–77.

28- Suzuki, Y., T. Takabayashi, T. Kawaguchi and K. Matsunaga. 1998. Isolation of an allelopathic substance from the crustose coralline algae, Lithophyllum spp., and its effect on the brown alga, *Laminaria religiosa* Miyabe (Phaeophyta). J Exp Mar Biol Ecol 225, 69–77.

29- Tillberg, J. E. 1970. Effects of abscisic acid, salicylic acid and trans- cinnamic acid on phosphate uptake, ATP-level and oxygen evolution in Scenedesmus. Physiol Plant 23, 647–653.

30- Watanabe, M. F., K. I. Harada, K. Matsuura, M. Watanabe and M. Suzuki. 1989. Heptapeptide toxin production during the batch culture of two Microcystis species (Cyanobacteria). J Appl Phycol 1, 161–165.

31- Welch, I. M., P. R. F. Barrett, M. T. Gibson and I. Ridge. 1990. Barley straw as an inhibitor of algal growth I: studies in the Chesterfield Canal. J Appl Phycol 2, 231–239.

مستخلص قش الأرز كمادة عضوية صديقة للبيئة يثبط نموطحلب الميكروسيستس أريجينوزا في المياة الطبيعية بالعباسة والريان بمصر

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٢- المكز الدولى لبحوث الأسماك مركز أقليمى لأفريقيا وغرب أسيا العباسة أبو حماد شرقية جمهورية مصر العربية

أستهدفت هذة الدراسة معرفة التأثير المثبط لمستخلص قش الأرز كمادة عضوية صديقة للبيئة على نموطحلب الميكروسيستس أريجينوزا في المياة الطبيعية بالعباسة والريان بمصركمبيد طحلبى طبيعي . فقد درست فعالية هذا المستخلص على نموطحلب الميكروسيستس أريجينوزا المعزول من منطقة الريان(RYAN) والعباسة(CLAR) فى وسط بيئى متخصص وكذلك المياة الطبيعية ومن الدراسة أتضح أن المستخلص كان له تأثير محد لنمو الطحلب فى الأربع معاملات عند تركيز ١و ، ٥و ، ٢.٥ ، ١٢.٥ مليجرام/لتر فى الوسط البيئى المتخصص وكان مثبط لنمو الطحلب فى المياة الطبيعية (مياة أحواض العباسة وأحواض الريان وبحيرة الريان) عند تركيز ١و ،٥و مليجرام/لتر على كلا من العزلتين فوجد تناقص ملحوظ فى أعداد الطحلب يزداد بمرور زمن التجربة ولم يوجد أختلافا معنويا بين المعاملات فقد سجل هذا التناقص فى الأعداد أكثر من٧٠% فى المعاملات اذا قورن بالمجموعة الضابطة

من هذة الدراسة يمكن الاستنتاج انه يمكن أستخدام مستخلص قش الأرز كمادة عضوية صديقة للبيئة كمثبط لنموطحلب الميكروسيستس أريجينوزا في المياة الطبيعية بالعباسة والريان بمصر عند تركيز ١و ،٥و مليجرام/لتر .