

Advantages Related to Spirulina Usage in Fish Farming: A Review



Zoology

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ABSTRACT

Spirulina algae are excellent Oxygen producers. The nutritive value of Spirulina is too high. It contains huge proportions of Proteins and Carbohydrates. The dried Spirulina is an exceptional feed for various aquacultured organisms. The aquaculturist farmers today are having low profit margin because they have to spend on buying feeds and have to pay out on electricity to drive aerators to maintain dissolved oxygen level in aquaculture ponds. But if Spirulina algae are reared in aquaculture ponds then there is no need of aerators as they themselves are good oxygen producers. Dried Spirulina can be given as feed to the aquacultured organisms as it has a lot of nutritive value. Similarly if the aquaculturist farmers begin rainwater harvesting, then a lot of expenditure can be reduced which is done on electricity and diesel to drive pumps to draw water from nearby fresh water resources for aquaculture. Thus the profit margin can be expanded.

INTRODUCTION

Spirulina: An Autotroph

Spirulina is blue green algae due to the presence of chlorophyll (green) and phycocyanin (blue) pigments in its cellular structure. Spirulina survive excellently in fresh water ponds and lakes with water alkalinity around 8 to 9. It lives very well in warm waters of 32°C and 45°C and has reportedly also survived in temperature of 60°C. It is an autotrophs as it exhibits photosynthetic activity. It is gram negative with a complex cell wall composed of peptidoglycan. The helical shape of the trichome is the characteristics of Spirulina. (Maddaly Ravi et. al., 2010)

Chemical Composition of Spirulina

The dry weight of Spirulina consists of 50 to 70 % of Protein, 5 to 7 % Lipids and 15 to 25 % of Carbohydrates. In various Spirulina species the total nucleic acid level is 4.2 to 6 % of the dry matter. Besides this Spirulina possesses Vitamin A, E, B and minerals such as Ca, P, Mg, Fe, Zn, Cu, Na and K (Jacques Falquet, 2010)

Oxygen production by Spirulina

Spirulina algae are excellent Oxygen producers. The trees on land can fix 1 - 4 tons of Carbon dioxide/hectare/year. But Spirulina algae are far more efficient as they can fix 23 tons of Carbon dioxide /hectare/year and they also produce about 16.8 tons of Oxygen/hectare/year. Spirulina in natural conditions or in fresh water ponds can produce a maximum of 1.15 ml/L or 7.15 mg/L of oxygen during day time per hour of light period. (Dinesh Kumar R. et. al., 2010)

Spirulina, an excellent feed for aquaculture

When dried Spirulina was being used as a dietary feed or a supplementary feed for various aquaculture fishes and prawns, then some excellent enhancement was observed in them. *Cyprinus carpio*, *Tilapia nilotica* and *Penaeus monodon* have shown significant improvement in their body colour when provided with a feed of spirulina. *Caranx delicatissimus* when provided with a Spirulina supplemented diet showed a marked development in colour, texture and taste of the ventral muscles. Superior growth rate was achieved in *Ictiobus cyprinellus*, *Tilapia aurea*, Silver Carp, Common and Grass Carp, upon addition of 10% Spirulina in their basal diet. While survival rate augmented drastically in fishes such as *Pseudocaranx dentex*, *Seriola quinqueradiata*, *Oncorhynchus masou*, *Plecoglossus altivelis*, *Anquilla japonica* and in giant fresh water prawn *Macrobrachium rosenbergii*. (Amha Belay et. al., 1996)

Present Problems in Aquaculture

With the advancement in aquaculture, today many small and large farmers are utilizing their non productive land for fresh-water aquaculture practices. But these farmers are facing some stiff challenges and problems such as 1) Complete dependency on nearby fresh water resources for aquaculture waters. 2) Use of electrically or diesel driven motor pumps to draw water from these resources adding to the expenditure. 3) Use of electrically operated aerators for maintaining suitable dissolved oxygen level for the breeding organism. 4) Using the traditional fish feeds and stocking one species in the pond at a time slowing down the productivity and output. Due to the above mentioned problems the expenditure is more and output is of a lesser amount, thus reducing the margin of profits for the farmers. (Katiha, 2005)

CONCLUSION AND DISCUSSION

Aquaculture has become a source of livelihood for many aquaculturist farmers but the problems and challenges in aquaculture have reduced their profit margin. Aquaculturist instead of drawing water from nearby freshwater natural resources can rely on supply of fresh water through rain water harvesting. In rain water harvesting the rain water is trapped and stored in artificial ponds or reservoirs and used for aquaculture. This will greatly reduce the dependency on nearby fresh water resources as well as it will help to save a lot of money which is spend on diesel or electricity to drive pumps which are used to draw water from these fresh water resources. This will definitely increase some profit of the aquaculture practicing farmers. Similarly if the aquaculturist farmers instead of using electrical aerators for maintaining the dissolved Oxygen level can culture live Spirulina algae in their pond in which they breed the fish. The dissolved Oxygen level will be maintained as Spirulina is an excellent Oxygen producer and Carbon dioxide consumer. This will surely add-on to the profit of aquaculturist farmers. Spirulina algae will not cause eutrophication as they will be cultured in rain water harvested pond, from which the water is not released in nearby water resources and used repeatedly. The aquaculturist farmer can do polyculture instead of monoculture and can also use dried Spirulina from their own culture ponds as feed for the fishes. The dried Spirulina because of its high nutritive value will lead to excellent development of aquacultured organisms. This will reduce the dependency of the farmers on other feeds, they can save money that is spend on buying these feeds. Thus Spirulina is an answer to some of the problems and challenges faced by today's aquaculturist.

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