EXTRACT *S. platensis* ADDITIVE USE IN PRACTICAL DIETS FOR *L. vannamei* (BOONE, 1931)

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Introduction

Spirulina platensis **is a microalgae that has gained attention in aquaculture due to its multiple benefits as an additive in shrimp feed. Spirulina is rich in high-quality proteins (about 60-70% of its dry weight), vitamins, minerals, essential fatty acids and antioxidants. It also contains a very interesting amino acid profile (Li et al., 2022). Spirulina contains phycocyanin, beta-carotene and other antioxidant compounds that help strengthen the immune system of shrimp, making them more resistant to diseases. There are studies in which greater phagocyte activity and improved resistance to pathogens have been observed when shrimp are fed diets that include spirulina (Al-Ghanayem, 2023) Investigate the use of extract spirulina additive inclusion of standard commercial *L. vannamei* diets and the effect on their shrimp growth and on its immune system. This research was carried out through a growth trial and a inmune trial.**

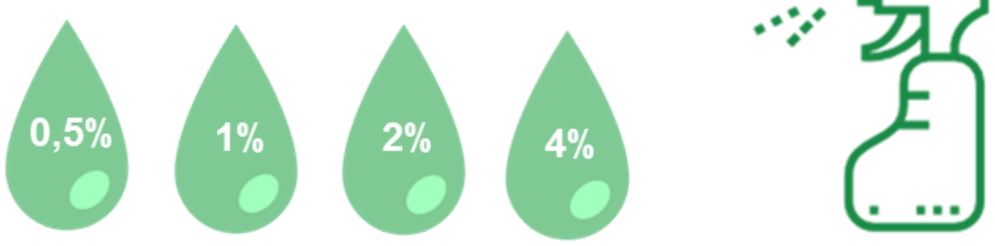
Material & Methods

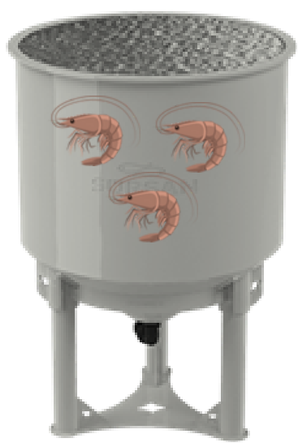
Ingredients (g)	CONTROL 0%	SP 0,5%	SP 1%	SP 2%	SP 4%
Fish meal	350	348.25	346.5	343	336
Soybean meal	260	258.7	257.4	254.8	249
Cornstarch	220	218.9	217.8	215.6	211.2
Wheat meal	100	99.5	99	98	96
Celulose	36	35	35	35	34
Fish oil	24	23	23	23	23
Vitamin mix	10	9.9	9.9	9.8	9.6
Spirulina extract	0	5	10	20	40

Table 1: Ingredient composition of the experimental diets. Diets were designed using a standard commercial formulation with a protein percentage of 33%.

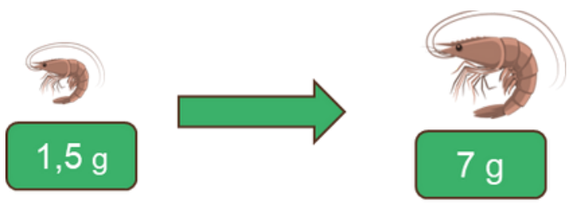
Spirulina extract additive

Liquid extract was applied with a diffuser directly to the mixture before extrusion





- **35 day trial**
- **5 diets (one without suplement)**
- **15 tanks (3 replicates per diets)**
- **Open clear water system**



Results & Discussion

Figure 1: Evolution over time of shrimp weight fed with 5 experimental diets (CON, SP05, SP1, SP2 and SP4) for 35 days.

In figure 1 evolution over time of shrimp weight can be observed. The shrimp began the experiment with an initial average weight of 2 grams in all treatments. At the end of the experiment, a final average weight of approximately 7 grams was obtained in all treatments. SP05 treatment obtained the highest final weight values at the end of the trial, however no significant differences were found among treatments.

Diets	Final Weight (g)			Survival (%)			SGR			FCR			PER		
CON	6,89	±	0,50	88,89	±	3,85	3,31	±	0,03	1,77	±	0,18	1,72	±	0,18
SP05	7,23	±	0,70	93,33	±	6,67	3,30	±	0,24	1,54	±	0,06	1,97	±	0,08
SP1	7,11	±	0,69	84,44	±	15,40	3,38	±	0,14	1,64	±	0,14	1,85	±	0,15
SP2	6,44	±	0,96	88,89	±	3,85	3,18	±	0,44	1,96	±	0,18	1,56	±	0,15
SP4	6,41	±	0,81	93,33	±	0,00	3,00	±	0,38	1,97	±	0,40	1,58	±	0,29

Table 2: Growth parameters (Final weight, survival, SGR, FCR and PER) of the 35-day experimental trial. Values are the mean (n=3) ± standard error (SE). Different letters in the same row indicate significant statistical differences (p<0.05). Newman-Keuls test..

Statistical analyses were done for all paraemters showed in table 2. The SP1 treatment obtained the highest SGR values at the end of the experiment but with no significant differences were found among them. Also, SP05 treatment obtained the lowest FCR values but again with no significant differences.

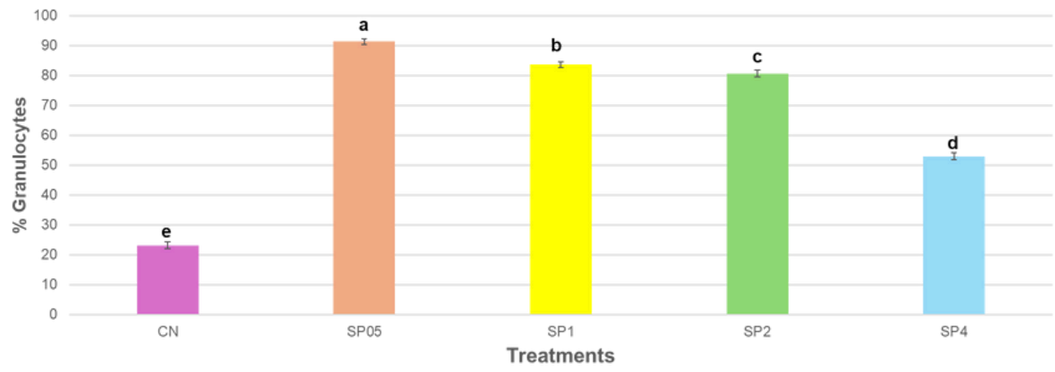


Figure 2: Percentage of granulocyte hemocytes in hemolymph samples from shrimp from different treatments. Different letters indicate significant statistical differences between treatments (p<0.05). Newman-Keuls test..

Results show that significant differences have been found in all treatments with the control, obtaining the lowest mean value of granulocytes (23.1%). Taking into account all the significant differences found, the SP05 treatment (91.4%) obtained the highest mean value of granulocytes, which makes it quite interesting given that it is the treatment with the least spirulina extract content (0.5%).

Conclusions

- ***Spirulina platensis*** **extract as an additive in diets for *Litopenaeus vannamei* does not have significant differences in its growth compared to control diet.**
- ***Spirulina platensis*** **extract as an additive in diets for *Litopenaeus vannamei* show significant differences between control and the rest of treatments in terms of % granulocytes in hemolymph**
- **SP05 treatment show highest results of % granulocytes (91.4%) making it a promising additive to improve inmune response of *Litopenaeus vannamei* to pathogens**

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References

Al-Ghanayem, A. A. (2023). Effect of Methanol Extracts of Arthrospira platensis on Survival and Increased Disease Resistance in Litopenaeus vannamei against Vibriosis. Journal of Pure & Applied Microbiology, 17(4).

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