EFFECTS OF 1,3-1,6 ß-GLUCAN FEED INCLUSION ON CAUDAL FIN REGENERATION PERFORMANCES OF ZEBRAFISH *Danio rerio*

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Introduction

Zebrafish (*Danio rerio*) are considered an interesting animal model for studying the tissue regeneration mechanisms because able to regrow amputated fins. Neutrophils and macrophages are involved in the tissues regeneration process. To this regard, β-glucans act as Pathogen Associated Molecular Patterns (PAMPs) and trough Pattern Recognition Receptors (PRRs) may "activate" immune cells, macrophages in particular, and the onset of a mediator's cascade that positively affects tissues regeneration process. In this study, we investigated the effect of 1,3-1,6 β-glucan (extract by Saccharomyces cerevisiae yeast cell wall) on zebrafish caudal fin regeneration.

Materials and Methods

Ninety fish were distributed into 3 groups (3 replicates). Two products were used as feed ingredient and sources of 1,3-1,6 ß-glucans: MacroGard® and "new" MacroGard (Biorigin©), MI and MII, respectively. The dose was 12.5 mg kg^{-1} BW and treatment started the same day fin amputation was performed. The fin regeneration process was observed and described by measuring the fin regenerated area as follow:

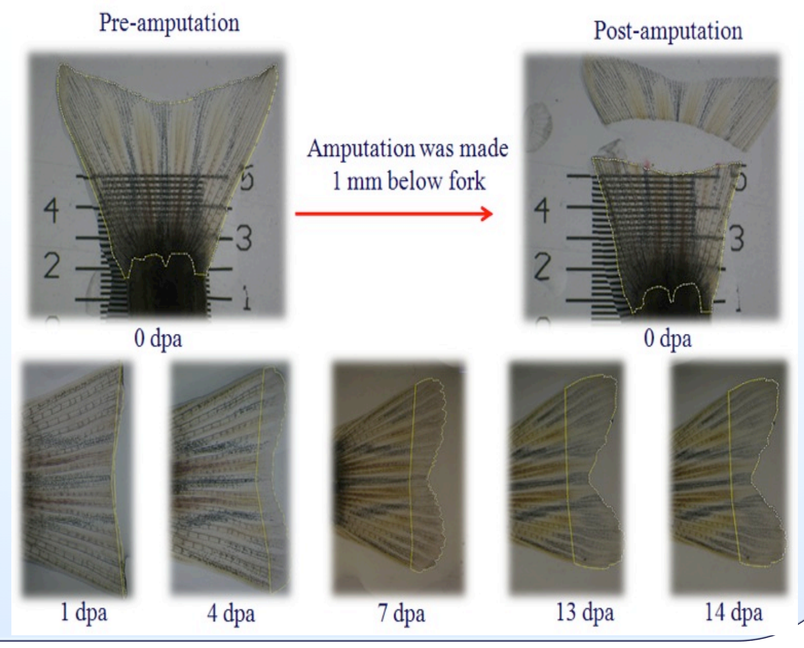
RA=(Fin Area dpax/Fin Areapre-amputation)*100

and calculating the daily regenerated area:

DRA=(Fin Area dpax+1 – Fin Area dpax)/Fin Areapre-amputation*100.

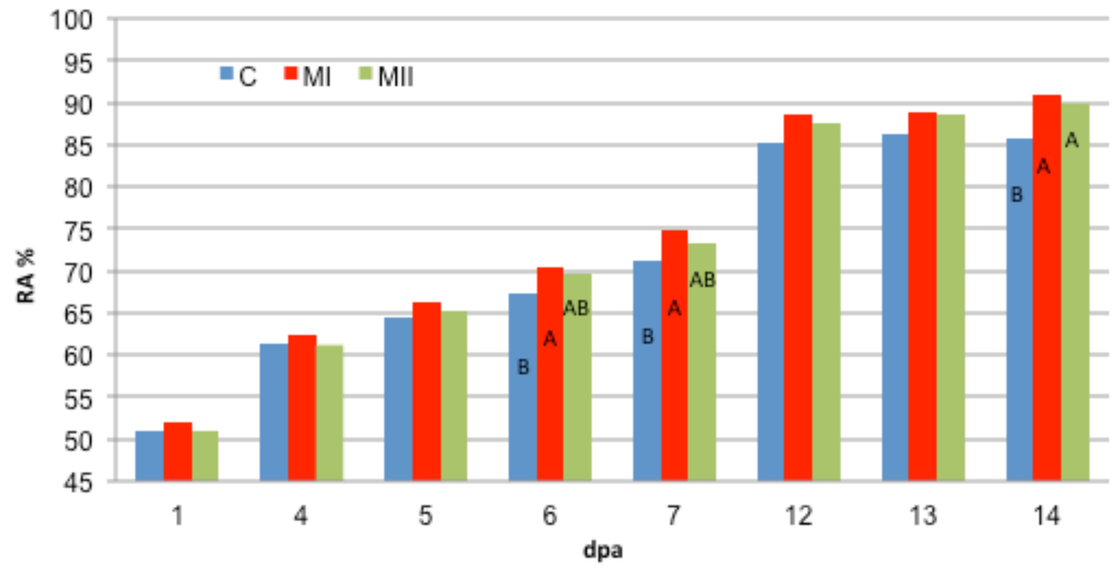
The fin regeneration process is also described by a non linear (quadratic) regression (see curves graph 2).

Sequential Pictures

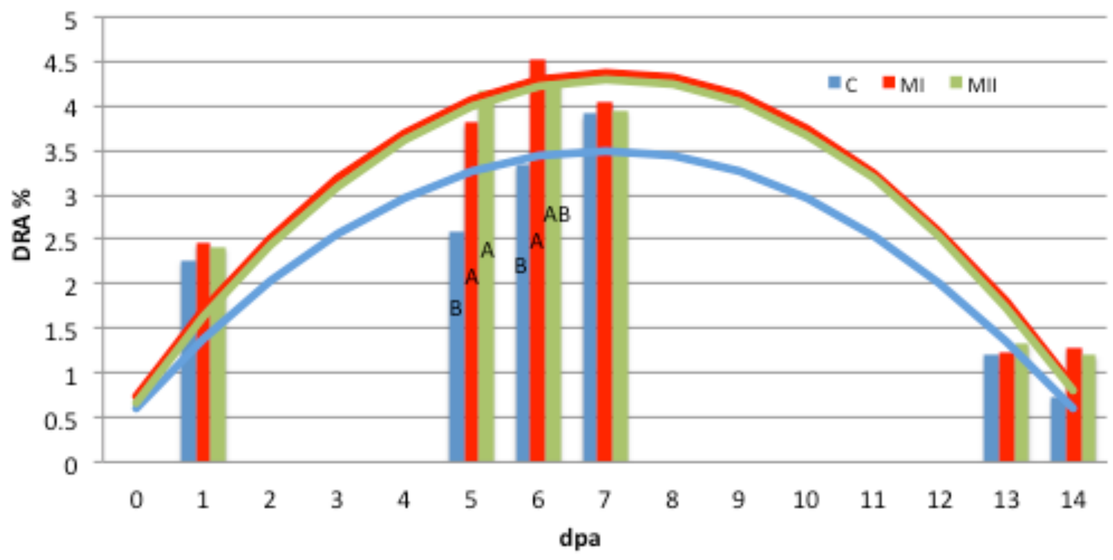


Results and Discussion

Graph 1: Measures of the fin Regenerated Area (RA)



Graph 2: Observed DRA values (bars) & quadratic regression (curves)



MacroGard® showed a significantly ($P<0.05$) positive effect on the fin regeneration process already after 6 days of treatment (Graph 1); in particular, on day 6 better RA values were observed for both group MI and MII, while better DRA value was observed for group MI only (Graph 2). During all the experimental period, no statistically significant differences ($P>0.05$) were observed between the two experimental groups (MacroGard® and "New" MacroGard®).

Conclusion

Both sources of 1,3-1,6 ß-glucans (MacroGard®) enhanced the tissues regeneration process; hence, it is highly suggested their administration (minimum dose of 12.5 mg kg-1 BW) to fish that may encounter risks of wounding (crowded conditions; handling process, etc.). In fact a not prompt tissue regeneration process at wound level may increase the risk of possible infections.

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