

EFFECT OF PAPRIKA OLEORESIN ON THE GONAD OF SEA URCHIN

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INTRODUCTION. One of the factors that determine the quality of the gonad is its colour. Depending on the local market preferences, the gonad colour can range from a light yellow to a dark orange or almost red. Lighter, pale coloured gonads or dark brown gonads are not as desirable to the market. The vegetables-based diets did not result in as good gonad coloration as did the pigment additive because the beta-carotene concentrations are very low so the pigment needs to be introduced in a concentrated form (Robinson et al., 2002). Paprika oleoresin may be an option to this problem being one of the most important natural extracts for the food industry. Paprika oleoresin consists of several carotenoid pigments and the most important are capsanthin, capsorubin and beta-carotene, accounting for 90% of the total pigments. The strenght is expressed as color units (c.u.) per g.

The aim of this study was to investigate potential colour-inducing paprika oleoresin that could be incorporated into an extruded diet to produce high quality colour in sea urchin gonads.

MATERIALS AND METHODS

Sea urchins, *Paracentrotus lividus* (Lamarck), of commercial size (>55mm) were collected, maintained in sea water aquaria and starved for 2 weeks prior to the start of the feeding experiment. Then, one-hundred-twenty sea urchins were measured, weighed and randomly assigned one of the four diets. There were three replicate tanks for each diet and the trial lasted 8 weeks. Test diameter, wet weight and gonad indices were calculated after 4 weeks and at the end of the experiment. Sea urchin roe content was assessed using the Gonad Somatic Index (GSI) as (gonad wet weight/total wet weight⁻¹).100 and given as a percent. Gonad colour was assessed qualitatively by comparison against a Pantone colour chart (Figure 1) and then each gonad was assigned to one of four colour categories by the same observer. The gonad colour categories from the most to the least desirable were defined as (Shpigel et al., 2006):



Whole weight, test diameter and gonad index were compared using one-way ANOVA.

RESULTS

Sea urchins indiscriminately consumed the diets with paprika oleoresin and without pigment (control) and only one individual died during the trial. Total weight, test diameter and GSI were not significantly different (ANOVA $p>0.05$) between the diets at the end of the experiment. After feeding extruded diets for 8 weeks, the GSI increased from 1.7 to 13.3% (Figure 2). The mean growth rate of the gonad over the experimental treatment was 1.4% per week.

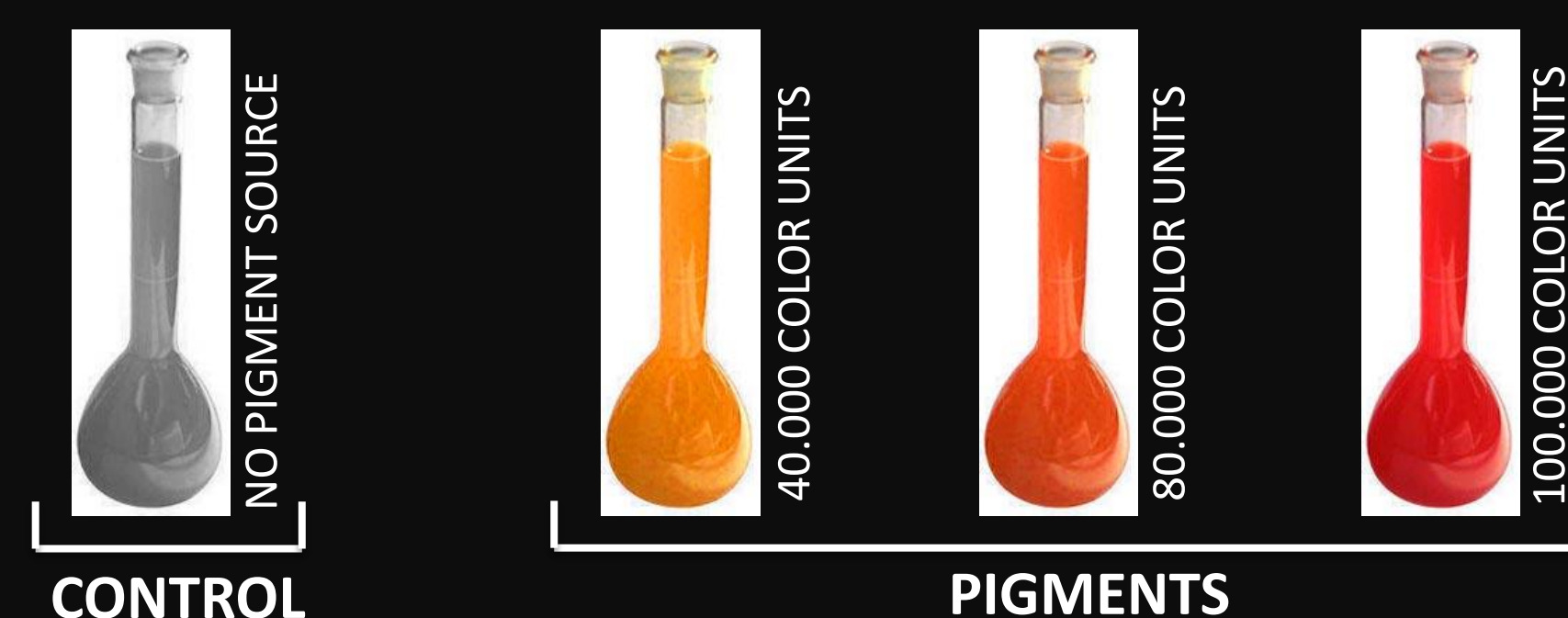
Gonads from sea urchins fed experimental diets for 4 weeks were variable and included all colour combination. In this sampling date, there were not differences between the oleoresin diets and the control. (Figure 3, left). However, after 8 weeks of feeding, the sea urchins fed oleoresin diets showed consistently better colour than control diet (Figure 3, right). In the control only 27% of the urchin gonads were acceptable (mango-orange, medium orange) while in the oleoresin diets this value increased to 73-80%, according to colour units. The most optimal colouration of gonads (mango-orange) was observed in the sea urchins fed OR-100 000 (47%), followed by OR-80 000 (40%) and OR-40 000 (27%).

THE DIETS

There were 4 experimental diets. The extruded diets were prepared with paprika oleoresin (*Capsicum annum*) supplied in color ranks (40 000, 80 000 and 100 000 color units) and a control diet with no added pigment source. Food was provided at 4% of the wet sea urchins biomass per aquarium every 3 days (Shpigel et al., 2004) and was available in excess at all times.



FOUR EXTRUDED DIETS



* Paprika oleoresins provided by Juan José Albarracín, S.A. (Pol. Ind. Cabezo Cortado, Espinardo, Murcia, Spain).



Figure 1. Qualitative comparison against a Pantone colour chart.

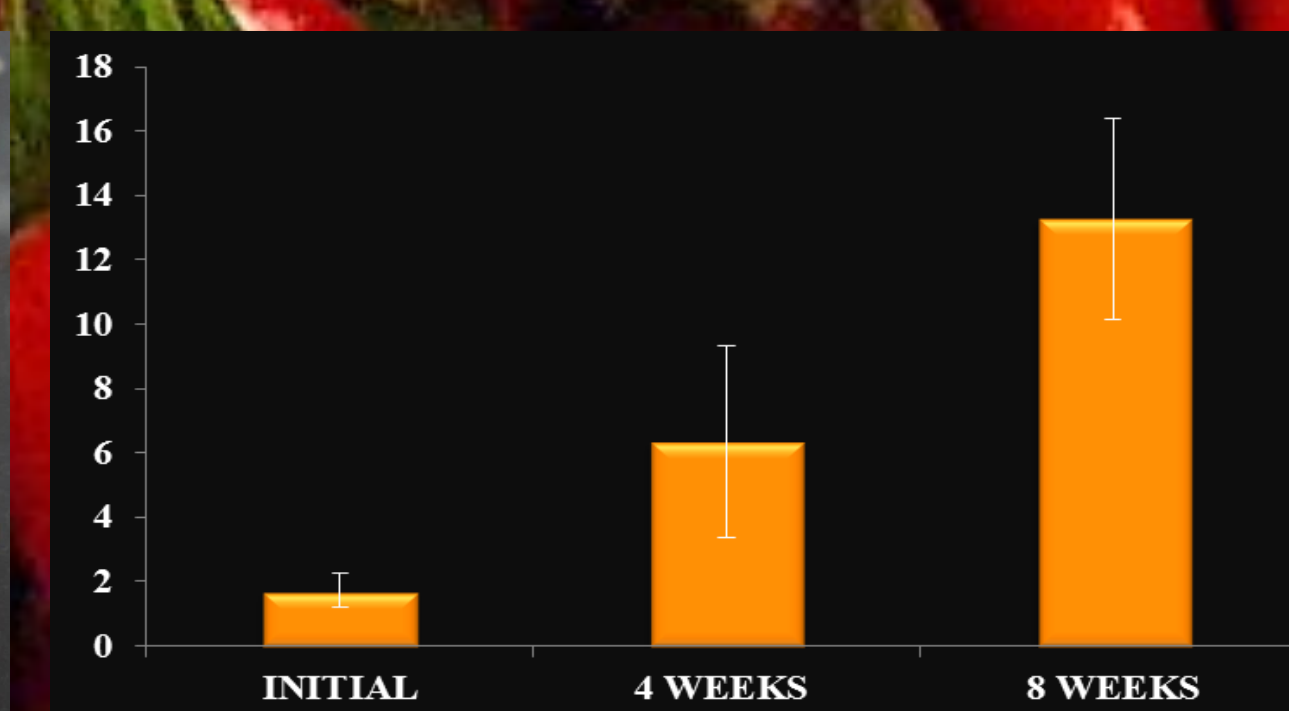


Figure 2. GSI (%) of sea urchins fed on extruded diet during 8 weeks (pooled data).

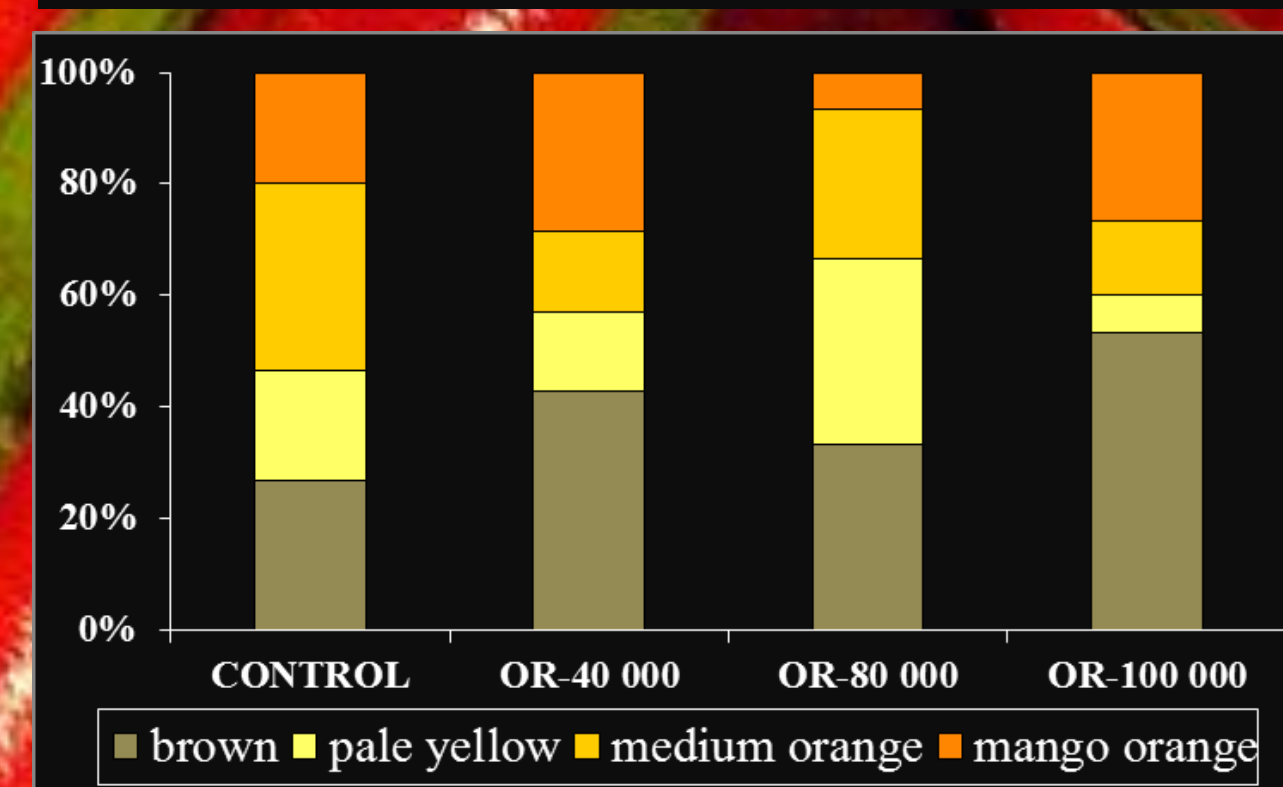


Figure 3. Percentage of sea urchin gonads in each colour category for sea urchins fed on extruded diet for 4 weeks (left) and 8 weeks (right). OR: oleoresin.

CONCLUSIONS Three colour intensities of paprika oleoresin were tested for their effect on colouration of *P.lividus* gonads and the results revealed the following conclusions.

- There was no effect of pigment on somatic and gonadal growth, so the gonad production is likely related to the amount of energy in the diet and the carotenoids are not essential for that.
- After 4 feeding weeks, GSI increased (1.7 to 6.4%) but the gonad colour was commercially unacceptable and there was no clear effect of pigment on the gonads. The lack of pigment in the gonad is probably related to the reproductive stage of the sea urchins.
- After 8 weeks, the oleoresin produced marketable colour gonads (80%) and there was a positive relationship between oleoresin intensity and optimal colour.
- Paprika oleoresin appears to be an effective dietary supplement for colouring the gonads of sea urchins. Also, it provides a value-added product and an alternative strategy for the urchin industry.

References

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