

EFFECT OF ILLUMINANCE AND WHITE LIGHT SPECTRUM ON GROWTH PERFORMANCE IN NOBLE CRAYFISH (*Astacus astacus* L.)

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Introduction

There is an increasing interest for intensive culture of noble crayfish (*Astacus astacus*) in recirculating aquaculture systems (RAS). The development of economically viable farms is mainly hindered by cannibalism and poor growth rates. In recent years, progress has been made in optimizing culture conditions for *A. astacus*. To date, the effects of illumination on noble crayfish growth remain largely unknown. In this study, we evaluated the effect of different light intensities and white light spectra on growth performance in noble crayfish summerlings during a six month trial.

Materials & methods

The crayfish

- 468 pond raised *Astacus astacus* summerlings;
- initial body weight: 0.66 ± 0.13 g (mean \pm SD).

The setup

- experimental period: 191 days;
- RAS: 18 rectangular tanks (length x width x height = 109 x 56 x 25 cm);
- stocking density: 52 crayfish.m⁻²;
- water temperature: 21.0 ± 0.4 °C;
- feed: carp pellets fed ad libitum every 24 hours;
- shelters: PVC pipes;
- lighting: six light conditions (see Table 1);
 - two intensities: weak light (38 lux) and bright light (761 lux);
 - three spectra: cool, neutral and warm white light (5500, 3800 and 2600K).



Fig. 1. Recirculating system with 18 tanks

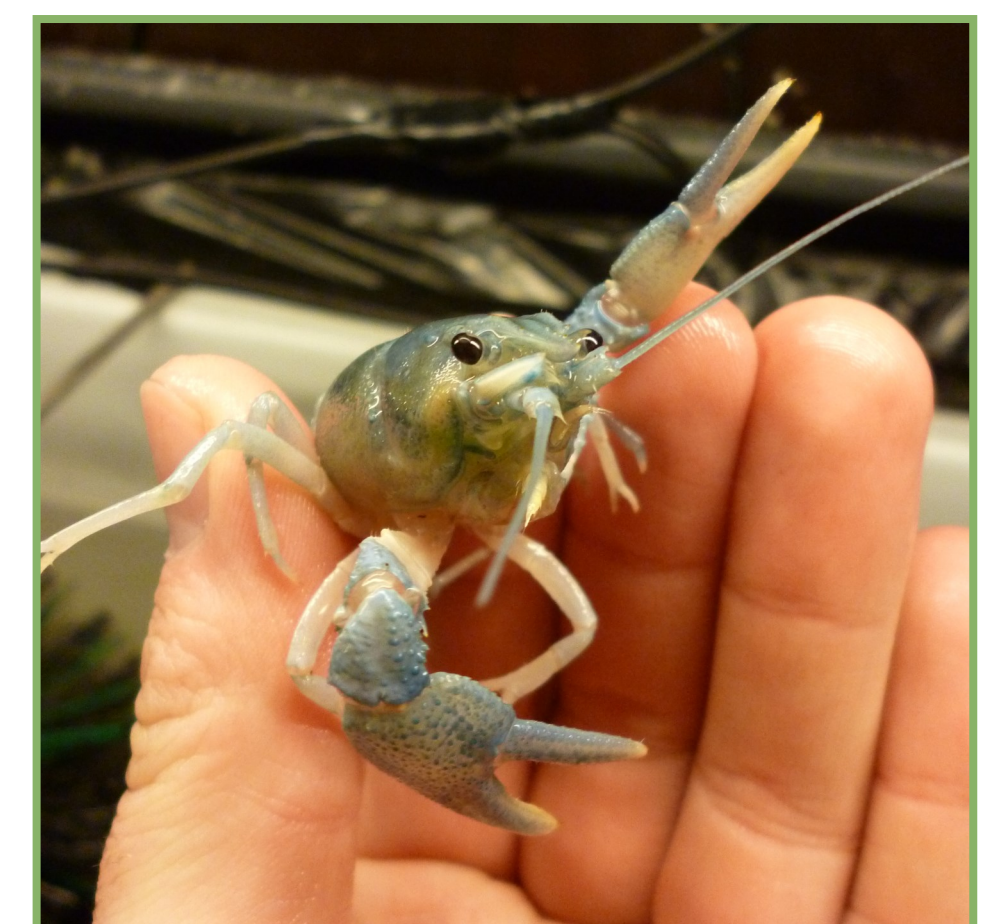


Fig. 2. Noble crayfish summerling

Results

- No differences in weight gain for the six treatments ($p=0.183$) (Fig. 3a);
- Combined results from treatments with the same **light intensity**, show higher growth in low lux treatments (Fig 3b);
 - Light intensity significantly affected weight gain ($p=0.040$);
- Combined results from treatments with the same **spectrum**, showed no differences in weight gain;
 - White light spectrum did not affect weight gain ($p=0.998$).

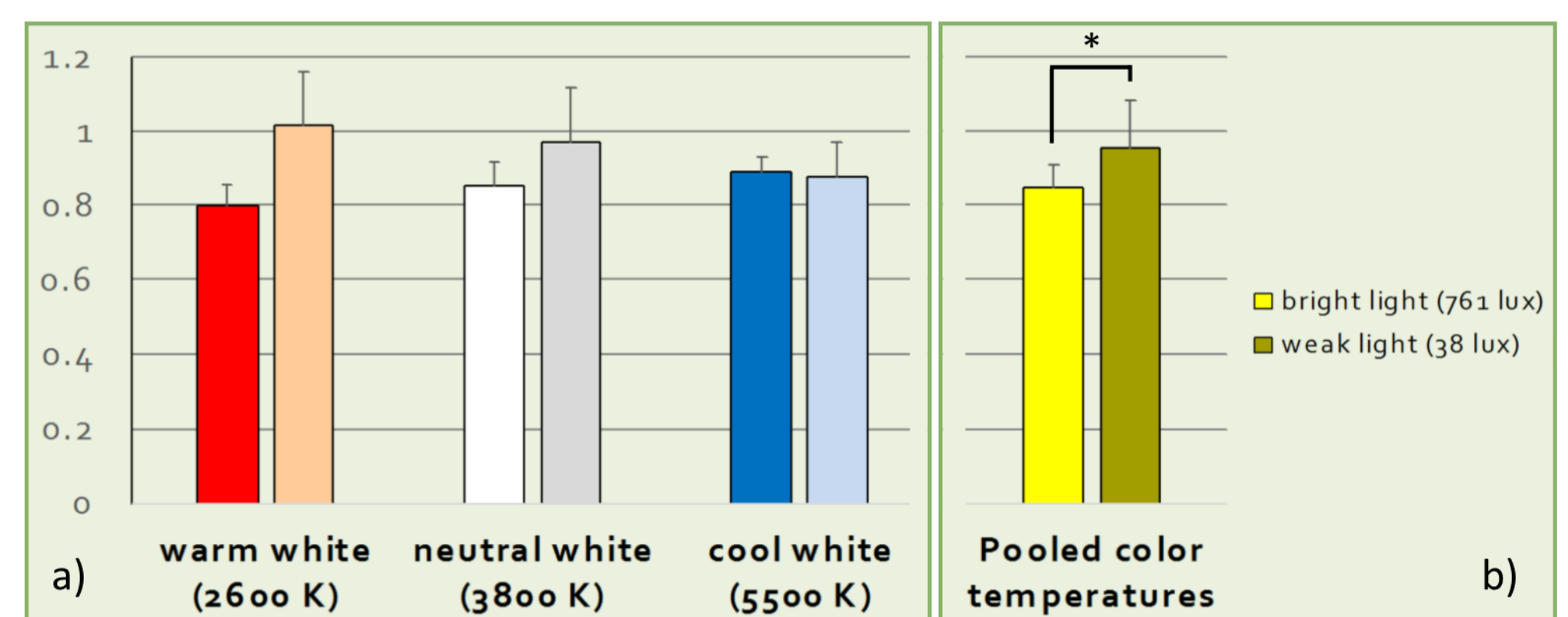


Fig. 3. Average weight gain per treatment. Asterisk (*) indicates statistical significance. a) weight gain for each correlated colour temperature (CCT) and light intensity. b) pooled data from all colour temperatures: 2600K, 3800K and 5500K.

Discussion & conclusion

- Light intensity is a determining factor for noble crayfish growth in recirculating aquaculture systems;
- Applying low light intensities in intensive noble crayfish culture can enhance growth, minimize electricity costs and therefore improve economic viability in crayfish aquaculture;
- More light intensities should be tested, in order to determine optimal illuminance for *A. astacus* culture.

Light condition	Lamp type	Intensity	Spectrum
warm white	bright light	Philips T8 36W 827	761 lux CCT \approx 2600 K
	weak light	Philips T8 36W 827	38 lux CCT \approx 2600 K
neutral white	bright light	Philips T8 36W 840	761 lux CCT \approx 3800 K
	weak light	Philips T8 36W 840	38 lux CCT \approx 3800 K
cool white	bright light	Philips T8 36W 865	761 lux CCT \approx 5500 K
	weak light	Philips T8 36W 865	38 lux CCT \approx 5500 K

Table 1. the six experimental light conditions, applied in the RAS