

Study of *Butea superba*. Roxb Root (Red Kwao Krua) Extract on Sex Reversal of Nile Tilapia by using Exponential Decay Pulse-Electric Fields

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The present study employs exponential decay pulse-electric field inductions to enhance sex reversal of Nile tilapia eggs in suspensions for monosex-male. The novel technique was the pilot study to initiate the usage of natural androgen hormone of *Butea superba* (Red Kwao Krua) extract instead of our previous electroporation medium of 17α - methyltestosterone (MT). The eggs of Nile tilapia obtained from our parent breeding stocks were carefully selected for inducement in pulse electric field strengths of 0.25 - $87.50 \text{ kV}\cdot\text{m}^{-1}$ generated between narrow plate electrodes. Electric fields of 3-5 exponential decay pulses of 5-100 μs durations were applied to optimize egg's electroporation. The prototype of the electrode equipped with the sequential signal pulse-generator (SPG) for on-site inductions was fabricated which could induce ≈ 50 eggs/SPG unit at one time. The electroporation medium (EPM) was prepared using HEPES buffer with a minimized concentration of the androgen hormone, *Butea superba*. Roxb Root (Red Kwao Krua, RKK) extract. Only minimal volumes (50 ml) of buffered MT medium were required. The electroporation of induced membrane pores were observed by determination of pore sizes and pore densities through SEM micrographs. After the process of sex reversal, induced eggs were grown up to fry sizes big enough (2 months old) to verify sex reversal. This novel technique reduced the RKK dose down to a minimized value of $1,500 \mu\text{g}\cdot\text{l}^{-1}$ and achieved a 69.14% male: female sex ratio.

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