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Feeding dynamics in European Seabass (Dicentrarchus labrax) post-larvae in turbulence

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A wide consensus exists that turbulence, unless reaching a threshold level, enhances ingestion rates in larval fish by increasing encounters with preys. This consensus, mainly derived from modeling exercises, relies on the two following assumptions: i) prey densities should be below saturating level, and ii) maximum intake rates by larval fish are independent of the turbulence level. While fine-scale studies within the feeding areas of larval fish showed that the first assumption is only seldomly met, the second assumption has yet to be validated. In this study, we experimentally investigated the effect of turbulence (Re ranging from 0 to 150000) on the ingestion rates in European Seabass (Dicentrarchus labrax) post-larvae exposed to realistic prey densities consistent with those observed in the natural environment. Contrarly to what was predicted by models in the case of a limiting prey density, our results revealed that increasing turbulence hampers the ingestion rates when food densities are realistic (i.e., high). The dynamics of food intake across three different flow levels (Re=0, Re=60000 and Re=120000) showed that maximum ingestion levels are turbulence-dependent; thus invalidating the above cited second assumption. On the light of these results, we draw the attention to the fact that our knowledge of the factors governing the plankton-turbulence coupling is still incomplete, especially as regards empirical results.