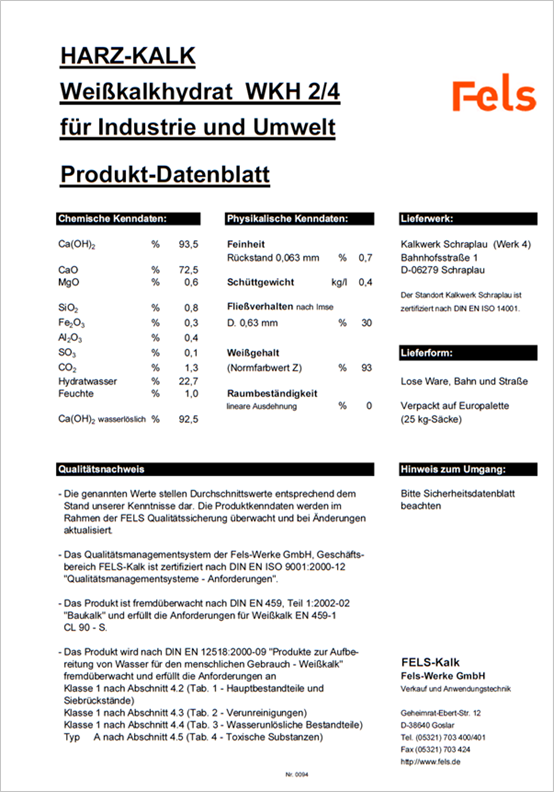
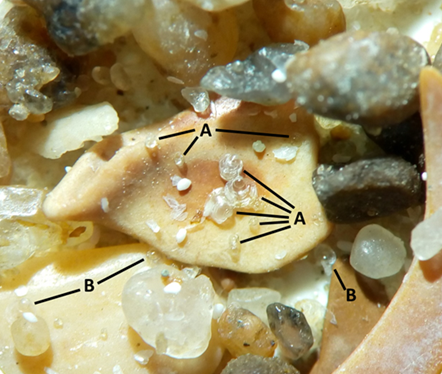
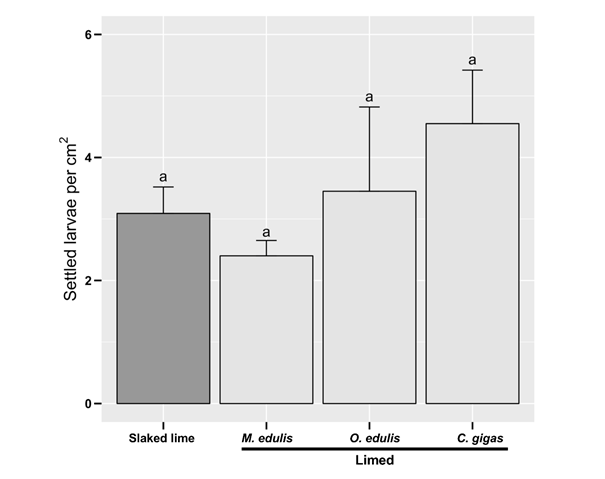
**Supplementary Material**



**Figure S1.** Technical data sheet of the composition of powdered hydrated lime from Fels-Werke GmbH used for the preparation of slaked lime (Ratio of 1 liter of seawater mixed with 1.2 liters of powder).

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**Figure S2.** Photograph of *Ostrea edulis* settled larvae on fine gravel sediment under a magnification of 8x. Larvae of *O. edulis* settled on a piece of shell are connected to points (A) by black lines; to points (B) are connected larvae settled on grains of sand or gravel.



**Figure S3.** Comparison of the settlement rate (orientations combined) of *Ostrea edulis* larvae between slaked lime (on tile) and marine bivalve shells coated with slaked lime in laboratory. Homogenous groups are marked with similar letter (ANOVA, F = 3.329, *p* = 0.077).



**Figure S4.** Overview of the different substrates of a single replica in their experimental structures. Photographs (1-3) correspond to the experiment 1. Categories from left to right: the shells, the inorganics, and the sediments. Photograph (4) correspond to the field experiment (all tested categories), and (5) corresponds to experiment 2 conducted on 3D reefs.

**Table S1.** Composition of the clay raw materials from the company Korallenwelten®.

|  |  |
| --- | --- |
| **Component** | **Proportion (%)** |
| SiO2 | 64.15 |
| Al2O3 | 12.56 |
| TiO2 | 1.15 |
| Fe2O3 | 1.06 |
| Na2O | 0.13 |
| K2O | 1.55 |
| CaO | 11.36\* |
| MgO | 8.03\* |
| SO3 | - |
| The clay from a clay deposit in Westerwald (Hessen, Germany) is supplemented with magnesium oxide and calcium oxide. | |

**Table S2.** Composition of the dolomite sand used for the 3D-ReefVival-Experimental-Reefs® printed by Boskalis Nederland BV.

|  |  |
| --- | --- |
| **Component** | **Proportion (%)** |
| CaO | 30.66 |
| MgO | 21.60 |
| Fe2O3 | 0.02 |
| Al2O3 | 0.02 |
| SiO2 | 0.08 |
| Loss 105-1100°C | 47.35 |

**TABLE S3.** List and distribution of the 20 substrates tested within the three experiments. Abbreviations: 1 = First laboratory experiment, 2 = Second laboratory experiment, 3 = Field experiment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Substrate categories** | **Materials** | **Experiments** | | |
| **1** | **2** | **3** |
| 1) Shells | *Crassostrea gigas* | X |  | X |
|  | *Mytilus edulis* | X |  | X |
|  | *Ostrea edulis* | X |  | X |
|  | *Pecten maximus* | X |  |  |
| 2) Inorganic | Baked clay | X |  | X |
|  | Electro mineral accretion | X |  |  |
|  | Granite | X |  |  |
|  | Slaked lime | X |  | X |
|  |  |  |  |  |
| 3) Sediments | Fine gravel | X |  |  |
|  | Coarse sand | X |  |  |
|  | Medium/Fine sand | X |  |  |
| 4) 3D structures | 3D-ReefVival-Experimental-Reefs® |  | X |  |
| 5) Of plant origin | *Phyllostachys edulis* |  |  | X |
|  | *Picea abies* |  |  | X |
|  | *Juniperus communis* |  |  | X |
| 6) Limed | Coated *C. gigas* shells |  |  | X |
|  | Coated *M. edulis* shells |  |  | X |
|  | Coated *O. edulis* shells |  |  | X |
|  | Coated *P. edulis* |  |  | X |
|  | Coated *P. abies* |  |  | X |