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Three promising salt-tolerant species – Characteristics and differences

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The circular approach of AQUACOMBINE combines aquaculture, farming and bioprocessing to utilize all fractions of the produced biomass and produce value added food, feed, bio-compounds and bioenergy.

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Halophytes are, by definition, plants that can complete their life cycle under a salt concentrations of at least 200 mM (11.68 g/L NaCl). The three halophyte species *Salicornia* spp., *Tripolium pannonicum* and *Crithmum maritimum* can be cultivated in saline soils or irrigated with seawater. The plants can also extract salts from the growing medium and thus desalinate soils. Species of the genus *Salicornia* are obligate halophytes: they need salt for their growth. These species have, e.g., root and stem anatomical features resulting from adaptation to salinity stress. *Salicornia europaea* produces a fresh biomass of 44 t/ha in 5 weeks after transplanting in hydroponics but increased to 104 t/ha at 10 g/L NaCl and 121 t/ha at 20 g/L NaCl in the culture medium. *Tripolium pannonicum* also has several mechanisms to cope with salt stress including changes in the anatomical structure, transport and compartmentalization of salt in the vacuole and production of secondary metabolites. Although this species can grow under high saline environments (up to 40 g/L NaCl), its productivity decreases with increasing salinity. Under non-saline conditions the fresh biomass production is 45 t/ha in 5 weeks after transplanting, but it decreases to 36 t/ha at 10 g/L NaCl and to 12 t/ha with 20 g/L NaCl. *Crithmum maritimum* is also a facultative halophyte; under saline conditions it is able to accumulate sodium in its tissues and increase metabolite production, and also enhances activities of antioxidant enzymes to cope with salt stress. However, biomass production decreases under saline conditions. The biomass productivity is also lower compared to *Tripolium* and *Salicornia*. Therefore, the productivity depends on the saline stress conditions as well as the plant species.

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