THE ABIOTIC GRIM REAPER: DETERMINING THE SURVIVAL OF SALT MARSH VEGETATION

Schwarz Christian[1], Tom Ysebaert[1], Liquan Zhang[2], Zhenchang Zhu[2] and Peter Herman[1]

[1] Netherlands Institute of Ecology (NIOO), PO Box 140, 4400 AC Yerseke, the Netherlands
E-mail: C.Schwarz@nioo.knaw.nl

[2] State Key Laboratory of Estuarine and Coastal Research, East China Normal University, 3663 Zhongshan Road North, Shanghai 200062, China

The colonization and spreading behaviour of marsh plants is strongly linked to their interactions with the abiotic environment. The outcome of these interactions forms the basis to evaluate, explain and predict distribution patterns and therefore the ability to support policy makers in the decision making processes for tidal wetland management.

The aim of this study is to evaluate the influence of abiotic parameters (hydrodynamic and sediment properties) on the survival and lateral expansion of two salt marsh pioneer plants (*Spartina alterniflora, Scirpus mariquter*), in order to find mechanistic explanations for patterns observed on a larger scale. These two species co-occur in the lower pioneer zone of salt marshes in the Yangtze Estuary, China; differing through their morphology does the native species *Scirpus mariqueter* exhibit a small and flexible habitus, the invasive species *Spartina alterniflora* a stiff and tall.

Different size classes of dispersal units (seedlings, rhizome fragments and tussocks) were planted at three different locations in the salt marsh pioneer zone of eastern Chongming Island, Yangtze Estuary, China. The planting date and period was chosen, to have a sufficient size and number of dispersal units (right after the growth spurt in early spring) on the one hand, and to include a period of high precipitation and strong winds (disturbed scenario: plum rain, around July) on the other. The locations were chosen accordingly to different sediment and hydrodynamic properties, which at the spot resulted in different patterns of the developing vegetation front.

Our results indicate the existence of a size threshold enabling these two ecosystem engineers to survive the disturbed scenario and therefore forming a selective mechanism. Further, we were confronted with an unexpected lower survival of the stronger ecosystem engineer *Spartina alterniflora*. This indicates that even though *Spartina alterniflora* constitutes the stronger ecosystem engineer (higher growth rate, earlier start-, longer vegetation period and higher sediment trapping ability) the stiffer aboveground parts and, compared to *Scirpus mariqueter* the lower investment in the belowground parts are exhibiting a serious viability disadvantage.

The implications of these findings not only help to explain the vegetation distribution patterns on Chongming Island, but also give important insights in the interaction mechanisms between plants and their abiotic environments including the perspective to explain patterns on a larger scale.