

Expansion of *Rosa rugosa* in Coastal Dunes

Species-richness in coastal dunes

Coastal dunes are one of the most valuable habitat types in Europe. They are often species-rich and contain many regionally rare plants. Therefore, dunes represent priority habitat types of the European FFH Directive. The preservation of semi-natural dune grass- and heathlands has a high conservation priority and the expansion of species-poor shrubland poses a serious conservation problem.

Shrubs in coastal dunes

The non-native *Rosa rugosa* establishes and spreads both in yellow dunes as well as in landward following grey and brown dunes (Fig. 1). As a result of dense dominant stands, many plant species of typical dune communities are shaded out. In comparison to the native *Hippophaë rhamnoides*, *Rosa rugosa* occupies a larger ecological niche (Fig. 1).

Rosa rugosa

Rosa rugosa was introduced to Europe in the 18th century. In comparison to its native range, *R. rugosa* estab-

lishes in NW Europe in various plant communities, at a wide range of environmental conditions (Isermann 2008a). In European coastal areas *R. rugosa* was planted for sand stabilisation, for marking boundaries of pathways, and it was also used as ornamental plant. *Rosa rugosa* occurs in dunes in various forms because of garden escapes that go wild, and which based on different cultivars. From the introduced sites, *R. rugosa* spreads into neighbouring dune areas, and due to tillers, it creates large, dominant and dense stands. Today it is widely distributed along the German North Sea Coasts.

Light availability

In general, relative light availability beneath shrubs decreases with increasing shrub cover. As to different growth- and leaf-forms, shading by *R. rugosa* is clearly more pronounced than shading by *Hippophaë rhamnoides* (Fig. 2). In the case of *H. rhamnoides*, the relative light availability decreases to about 20%, but in the case of *R. rugosa* there is more or less complete shading. Thus ecological consequences are more improved in comparison to *Hippophaë rhamnoides* (Isermann 2008b).

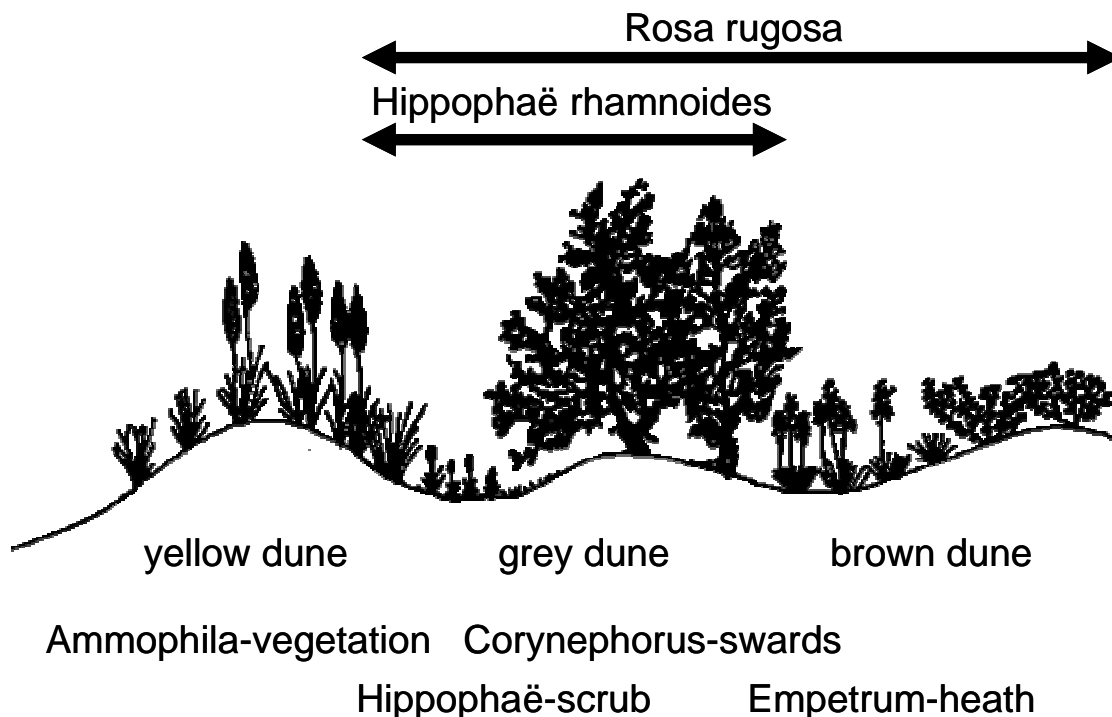


Fig. 1. *Rosa rugosa* and *Hippophaë rhamnoides* in coastal dunes, M. Isermann.

Decreasing species richness

Total species-richness decreases with increasing cover of *R. rugosa*, and declines in all dune vegetation types (Isermann 2008c). The number of typical grassland species declines especially in the case of species-rich *Corynephorus*-swards, but also in the case of *Ammophila*-vegetation and *Empetrum*-heathlands (Fig. 3). Moreover, the number of Red-Book-Species decreases with increasing *R. rugosa* cover. Furthermore, decline in species-diversity (Shannon, evenness) is more improved in the case of *R. rugosa* than in *H. rhamnoides* (Isermann 2008b). Shading-effects are similar in all dune habitats, as well as are similar at different scales (1-16 m²) (Isermann 2008b).

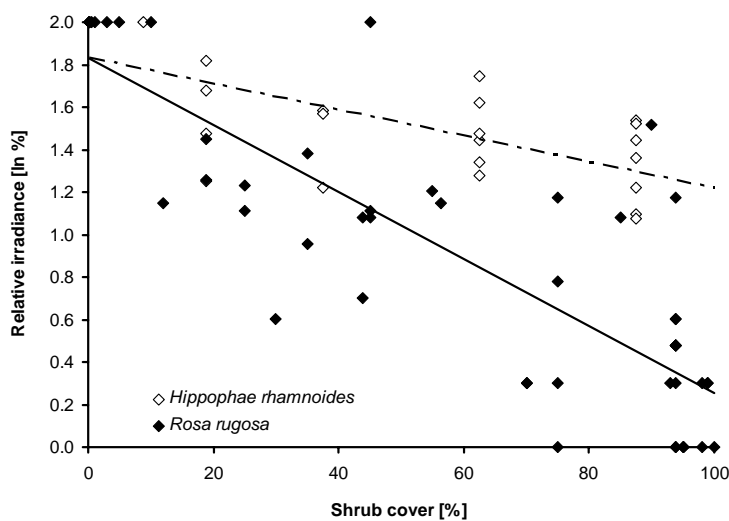


Fig. 2. Decreasing light availability with increasing cover of *Hippophae rhamnoides* and *Rosa rugosa*, M. Isermann.

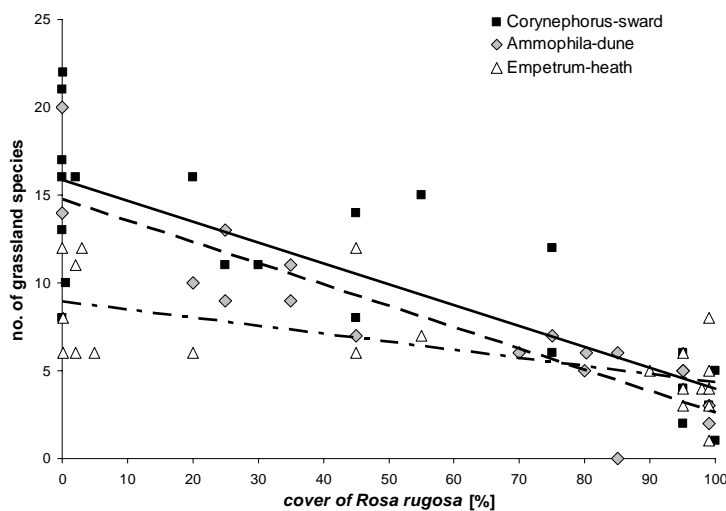


Fig. 3. Decline in the number of grassland species with increasing *Rosa rugosa* cover in different dune types (Isermann 2008c).

Conclusion

Decline in species-richness, change of vegetation composition as well as reduction of landscape diversity due to extensive dominant stands manifest *Rosa rugosa* as a serious problem in relation to sustainable protection of biodiversity in coastal dunes.

Outlook

A current research project (2008-2011; Prof. Dr. Martin Diekmann, Dr. Maike Isermann, Bremen University; Prof. Dr. Ingo Kowarik, Dr. Anna Jürgens, TU Berlin) is supported by the Rudolf and Helene Glaser Foundation. Using *Rosa rugosa* the project will exemplify, how a differentiate analysis of species invasion potential in relation to various habitats, could be used for nature conservation strategies. The project is dealing with following questions:

- Which genotypes and *Rugosa*-hybrids were and are planted in German coastal areas?
- What differences of invasion potential exist, regarding dispersal, establishment, and spreading between *Rosa rugosa* types in various coastal dune areas?
- How do different dune types vary in relation to habitat suitability in relation to *Rosa rugosa*?

References

- Isermann, M. (2008a): Classification and habitat characteristics of plant communities invaded by the non-native *Rosa rugosa* Thunb. in NW Europe. - *Phytocoenologia* 38: 133-150.
- Isermann, M. (2008b): Expansion of *Rosa rugosa* and *Hippophae rhamnoides* in coastal grey dunes: effects at different spatial scales. - *Flora* 203: 273-280.
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