The 14 grass species were grown under optimal conditions in a growth room. With chemical analyses we determined total nitrogen and carbon content. Light microscopy and picture analyses with an IBAS image processing system were used to analyse the anatomy of the leaf sections.

Species with a low RGR had a higher carbon content (and accumulated more lignin) than those with a higher RGR. The organic nitrogen content was positively correlated with the RGR.

The number of sclerenchyma cells correlated inversely with the RGR. The thickness of the epidermal cell walls was the same for all grasses. The size of these cells, however, was positively correlated with the RGR. For the mesophyll cells no RGR-correlated effects were found.

Leaves of low-RGR species contain relatively more cell-wall material than high-RGR species, possibly partly based on an increased number of sclerenchyma cells.

Localization and Regulation of Thiophene Biosynthesis in *Tagetes patula*

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Root cultures of *Tagetes patula* accumulate high amounts of thiophenes (Croes, A.F. *et al.* (1989): *Planta* **179**: 43–50). The most abundant thiophene is 5-but-3-en-1-ynyl-(2,2′)bithiophenyl (BBT). In feeding experiments with [^{35}S]-labelled BBT we have shown that almost all naturally occurring thiophenes in *Tagetes* can be formed by modifications of the side chain. This suggests that side-chain modification occurs after the formation of the heterocyclic thiophene rings.

We have identified the monothiophene 2-but-3-en-1-ynyl-5-penta-1,3-diynyl thiophene (BPT) as a key intermediate in the biosynthetic route towards BBT. This result indicates that the position and sequence of thiophene ring formation are strictly regulated and not more or less randomly determined as was suggested previously (Jente, R. *et al.* (1981): *Phytochemistry* **20**: 2169–2175).

By cell fractionation it was shown that thiophenes accumulate in the microsomal fraction. Combined cell fractionation and radiolabelled precursor feeding will enable us to find out in which cellular compartments thiophenes are formed.

If thiophene biosynthesis can be pin-pointed to specific cell fractions, examination of these fractions may facilitate the isolation of key enzymes and the study of their metabolic and molecular regulation.

Ethylene and Flooding Resistance. I. An Ecophysiological Approach with *Rumex* as a Model

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As an ecophysiological research group, the authors are concerned with the occurrence and distribution of plant species in riparian areas of the Rhine river system in the Netherlands. During the last decades, plants within these areas have been confronted with infrequent and unpredictable floods during the growing season due to improved drainage in the upper Rhine area. The down-stream flood plains are characterized by differences in elevation, leading to a distinct flooding gradient and a typical plant zonation.

In order to elucidate this zonation, investigations were started with eight species of the genus *Rumex* which occurred in the river area, each having a specific position in the flooding gradient. The central hypothesis is that the *Rumex* zonation is mainly determined by the resistance of the different species to flooding. As a consequence of the ecological approach, experiments, both in the field and laboratory situation, are conducted on all life stages of these species.

Adaptations of *Rumex* spp. towards flooding are aerenchyma formation and enhanced shoot elongation. Ethylene plays a central role in the initiation and regulation of most of these adaptive responses. Future research will concentrate on the mechanism of ethylene-mediated shoot elongation and aerenchyma formation, and the interaction of ethylene with other plant hormones in these responses.

Ethylene and Flooding Resistance. II. Application of an Advanced Laser-Driven Photoacoustic Cell in Ethylene Measurements on Flooded *Rumex* Plants

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The regulation of some important adaptations of the genus *Rumex* (sorrel or dock) towards flooding is mediated by ethylene. During flooding, ethylene tends to accumulate in plant tissues due to the very slow diffusion rate of gases in water and increasing ethylene production rates. High ethylene concentrations in the shoots of flood-adapted *Rumex* spp. induce fast elongation of the petioles and leaves.