Background: Variable habitat conditions contribute to morphological variability that plays a substantial part in evolution of plants. Understanding the extent of phenotypic plasticity has important implication for assigning individuals to taxa.

Aims: I analysed morphological variability among populations within species of the *Carex flava* group and tested to what extent morphological variability was associated with habitat conditions.

Methods: A total of 571 specimens from 20 populations of four species from the *C. flava* complex were sampled in Poland and tested by Discriminant Function Analysis (DFA). The relationship between morphological characters and habitat factors was explored by means of the redundancy analysis (RDA).

Results: Variability of the generative and vegetative traits was fairly similar in *Carex lepidocarpa, C. flava* and *Carex demissa*, while it was somewhat higher in *Carex viridula*. The morphological traits were mostly related to soil organic matter content, calcium and carbonate, as well as to habitat fertility (C:N ratio), elevation and habitat disturbance. The results obtained do not support the separation of *C. viridula* var. *pulchella* from *C. viridula* var. *viridula*.

Conclusions: Phenotypic variability in the species of the *C. flava* complex is related to habitat conditions and this can lead to the differentiation of morphotypes within species.