Hieracium subgen. Pilosella
A group of about 250 European hawkweed species, some of them invasive.

Basic species
About 25 species of Hieracium subgen. Pilosella with unique morphological features, some of them comprising diploid plants.

Intermediate species (hybridogogenous taxa)
About 180 Pilosella species with character combinations of two or more basic species. Hybrid origin supposed. Most of them triploid, many with apomictic mode of reproduction.

Glossary

Apomixis (apomictic, agamic)
Reproductive mode that produces seeds true to maternal type without fertilization. Facilitates spread of clonal lineages by seed dispersal (easy colonization of new habitats). Apomicts usually produce fertile pollen.

Facultative apomicts (facultative sexuals)
Plants reproducing predominantly by apomixis, but can be sexual occasionally, e.g., produce seeds after hybridization.

Polyhaploids
Plants produced by meiotically reduced maternal gametes without fertilization. While this means haploidization in case of a diploid mother, the offspring is more than haploid if the mother was polyploid.

Example: a haploid mother produces trihaploid (= triploid) offspring (in contrast to a triploid hybrid that has two parents).

Addition hybrids
Hybrids with higher ploidy than the sum of their parents’ reduced (n-n) chromosomes sets due to a combination of reduced and unreduced (2n+2n) or only unreduced (2n+2n) gametes.

Cloroplast DNA divergence, phylogeography and introgression history at species level

Geographic distribution of species according to cp haplotype

ITS tree of diploid basic species with distribution of major cpDNA haplotypes

Population structure of sexuals and apomicts in two Central European mountain ranges

Despite an almost identical set of basic species and stabilized intermediate species in both areas, composition of hybridogenous species and F1 hybrids, their cytotypes, reproductive modes and cpDNA subtypes partly differ.

Hybrid phenotypes assigned to the same species name / parental combination are mostly indistinguishable morphologically, irrespective of these differences.

Species are similar with respect to major chloroplast haplotype groups (either Pilosella I or Pilosella II or mixed).

In both regions, a high proportion of hybridogenous species with sexual and apomictic parents had the apomix as maternal parent (residual sexuality) in contrast to a comparably low frequency of such hybrid progeny in experiments.

Different progeny proportions of stabilized and recent hybrid genotypes in one species

Hybrid genotypes that form stable populations produce mainly offspring by apomixis and thus have a high chance to become established hybridogenous species. This is supposed to be the main process of apomictic species formation in Pilosella.

Due to their residual (facultative) sexuality (additional to pollen fertility), clonal lineages can be maintained without becoming dead ends of evolution.

Hybrid genotypes that do not form stable populations behave differently from each other and produce considerably less progeny by apomixis than do stabilized types. Instead, they produce a high proportion of polyhaploids and/or hybrids, which represent further raw material for selection.

Unreduced gametes (esp. male ones) are rare, but drive the process of polyploidization.