

Pollen analysis of *Heliophila* (Brassicaceae) using scanning electron microscopy (SEM)

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Abstract

The Brassicaceae (Mustard) family has 320 genera and 3660 species distributed worldwide. This family is easily identifiable by its cruciform corolla, tetradynamous stamens, and capsular fruits. The mustard family is important because commercial crops such as broccoli, kale, horseradish, turnips and watercress can be found within this family. Also, Canola Oil is produced from the seeds of species in the *Brassica* genus of the Brassicaceae family. The most diversified lineage of the Brassicaceae is the genus *Heliophila* which has 88 recognized species endemic to South Africa. Previous work into this genus has found that the species displays a variety of flower and fruit morphology as well as habitat and substrate types such as limestone, sandstone, and shale. A recent phylogenetic study into this genus has determined three major clades nestled within *Heliophila*. One area that has not been extensively researched is the palynological features of the genus. Brassicaceae is thought to be a stenopalynous family with a coarse reticulate ornamentation; however, a small survey of three taxa of *Heliophila* has shown at least two pollen ornamentation types. It is unknown if there are more than two pollen types to be found in this genus, how the pollen types are distributed amongst the taxa, and if there is any systematic significance to the distribution of pollen types. We examine pollen ornamentation of 62 species belonging to the genus *Heliophila* of the Brassicaceae family using scanning electron microscopy (SEM). Untreated pollen grains were mounted to SEM stubs from anthers on dried herbarium specimens. The stubs were sputter coated for two minutes at 35 mAmps and then placed in a JCM-5000 scanning electron microscope for viewing. In addition to SEM photographs, measurements were also taken for 10-15 pollen grains per species and the polar, equatorial, and colpi length were recorded and averaged. Based on the measurements, the pollen grains were tricolpate with a prolate shape in agreement with other Brassicaceae pollen features. Two major pollen types were found to be distinct in their ornamentation and one minor pollen type was also identified. The first major pollen type is spinulose and 41 species exhibited this type of ornamentation. The second major pollen type is reticulation and 17 species exhibited this type. Our results suggest that *Heliophila* is heterogeneous for pollen ornamentation among the Brassicaceae genera. We have also determined that dividing taxa in *Heliophila* may be difficult to do considering the presence of the minor pollen type. In conjunction with other sources of data however, palynological features will add to our knowledge of *Heliophila* systematics as well as encourage other pollen studies into the genera of Brassicaceae.