Morphological characteristics between the two cultivated types of *Perilla* crop and their weedy types

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We evaluated the morphological characteristics of 54 Perilla accessions by examining two quantitative and four qualitative characteristics in order to better understand the relationships between the two cultivated types of *Perilla* and their weedy types. The seed size, seed germination, seed hardiness, and seed color were examined. The seed size and germination ranged from 2.08 mm to 2.96 mm and from 54 % to 99 %, respectively, for cultivated *Perilla frutescens* var. *frutescens* (var. *frutescens*). Most accessions had soft seeds, but seed colors varied from white, gray, and brown to dark brown. The weedy type of var. *frutescens* showed a seed size range of 1.54 mm to 1.94 mm, a seed germination range of 0% to 46%, and had only hard seeds and showed only dark brown seed color. While the cultivated type of *Perilla frutescens* var. *crispa* (var. *cirsia*) showed a seed size range of 1.6 mm to 1.72 mm, a seed germination range of 3% to 34%, and only hard seeds with a dark brown seed color. The weedy type of var. *cirsia* showed a seed size range of 1.45 mm to 1.96 mm, a seed germination range of 0% to 27%, and also hard seeds with a dark brown color. Principal component analyses clearly discriminated cultivated var. *frutescens* from weedy var. *frutescens*, and cultivated and weedy types of var. *cirsia*. However, on the basis of seed characteristics, the cultivated type of var. *cirsia* and its weedy type were not clearly discriminated. By contrast, seed size, seed germination, and seed hardiness were useful characters for discriminating between cultivated var. *frutescens* and cultivated and weedy types of var. *cirsia*, and between cultivated var. *frutescens* and its weedy type. The present study has demonstrated the utility of morphological analysis in the study of morphological variations in the two cultivated types of *Perilla* and their weedy types.

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