Mechanization of threshing and separation of *Origanum onites* is limited by practical constraints. In this study, we investigated the effects of moisture content on physical and mechanical properties of *O. onites* to be applied to the design of mechanized threshing and separation operations. Leaf, stalk and flower dimensions, projection area, picking force, leaf-to-stalk ratio, leaf-to-flower ratio, and essential oil content of *O. onites* were determined at three different moisture contents: 8.9 %, 11.4 %, and 15.0 % (d.b).

Most parameters increased linearly with increasing moisture content. The essential oil content of *O. onites* decreased with increasing moisture content. Moisture content had a significant effect on the physical and mechanical properties of *O. onites*. Flower picking force of *O. onites* varied between 3.630 and 4.050 N and leaf picking force of *O. onites* varied between 0.375 and 0.974 N. Data on stem diameter are used for designing threshing and separation machinery, while data on flower projection area are required for effective transport, cleaning, and separation of *O. onites*. Moisture content of *O. onites* should be optimized to achieve ideal machinery design, as well as energy, power, and cost savings.