

学 位 論 文 要 旨	
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題 目	Physicochemical Properties, Flavor Characteristics, and Biological Functions of the Chili Pepper Shimatogarashi (<i>Capsicum frutescens</i>) (島トウガラシ(<i>Capsicum frutescens</i>)の物理化学的特性、フレーバー特性および機能性)
<p>Chili peppers (<i>Capsicum</i> spp.) play a significant role in the culinary world as popular ingredients with their typical spiciness. In Japan, Okinawa has an endemic hot chili pepper cultivar, known as Shimatogarashi, which belongs to the <i>Capsicum frutescens</i> species. Shimatogarashi is used in exotic condiments that hold potential economic value, but very few studies have explored their properties. This study aimed to evaluate the physicochemical properties, flavor characteristics, and biological functions of the Shimatogarashi chili pepper.</p> <p>The hotness or spiciness of chilies has received much attention in chili pepper breeding, whereas their flavor, which is associated with aroma and taste compounds, differs between chili varieties. Therefore, comparative studies evaluating the physical properties, flavor characteristics, and antioxidant capacity had been conducted between the chilies Shimatogarashi and Takanotsume (<i>Capsicum annuum</i>), which is the most popular chili pepper in Japan. Shimatogarashi was brightly red colored and highly pungent with a fresh and fruity aroma, whereas Takanotsume was dark red in color and moderately pungent with a warm and herbaceous aroma. Shimatogarashi also showed higher antioxidant activity than Takanotsume in terms of their total phenolic content and oxygen radical absorption capacity. The results demonstrated that Shimatogarashi had unique physical, flavor, and antioxidant properties compared to Takanotsume.</p> <p>Shimatogarashi undergoes several color changes from green to orange and then to red during fruit maturation. This is accompanied by changes in the fruit metabolites, which affect the aroma, taste, and antioxidant property of the fruit. The evaluation of color, organic acid contents, capsaicinoids, aroma compounds, and antioxidant activity during maturation of Shimatogarashi fruit revealed that its profile developed towards a more pungent and citrus-like aroma, and higher antioxidant capacity at the mature red stage than the immature green stage. On the other hand, utilization of the fruit at its immature green stage is beneficial owing to its pleasant fruity aroma, which may be useful in condiments.</p> <p>The potential of Shimatogarashi, as a healthy food to preventing obesity which is closely linked to metabolic syndrome was also investigated using 3T3-L1 preadipocytes. Interestingly, the methanolic extract of mature red Shimatogarashi fruit reduced the accumulation of intracellular lipids in a dose-dependent manner during differentiation of 3T3-L1 cells into adipocytes. Moreover, it was shown that the extract attenuated adipogenesis and expression of the peroxisome proliferator-activated receptor γ as an adipogenic marker in differentiated 3T3-L1 adipocytes. Therefore, it was concluded that Shimatogarashi is a promising source of natural antioxidants with potential biological influence in adipogenesis.</p>	