

学 位 論 文 要 旨	
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題 目	Growth and chemical characteristics and classification of Okinawan Welsh onions (<i>Allium</i> spp.), and cultivation of two strains under saline conditions (沖縄県産ネギ類 (<i>Allium</i> spp.) の生育・化学的特性および分類と二系統の塩環境下での栽培)
<p>In Okinawa prefecture, some types of Welsh onion (<i>Allium fistulosum</i> L.) are grown; however, none of these plants is known as a commercial cultivar because of insufficient data. Firstly, growth, flavor and antioxidant parameters of them were studied. We investigated growth and morphological characteristics of 10 Okinawan Welsh onion (<i>Allium</i> spp.) cultivars, and one Kyoto Welsh onion cultivar and one Nagasaki Wakegi cultivar as controls. We classified Welsh onions into three groups: flower-bud formation with wide leaf sheath diameter (Type I), summer-dormant (Type II), and no flower-bud formation and dormant season (Type III).</p> <p>Seven cultivars from three groups were selected, and volatile aroma compounds of them were examined using gas chromatography (GC) and GC-mass spectrometry together with the controls. Aroma compounds were classified into four functional groups: primary thiols, sulfides, alcohols, and aldehydes. Two-dimensional principal component analysis was used to assess the relative concentrations of the four functional groups to classify the aroma characteristics. The classified compounds were found to be closely related to the morphological characteristics, except for those of 'Makabe'. Furthermore, total phenolic contents and antioxidant activities of the Welsh onions were determined to evaluate the food functionalities. Type II and type III showed a positive correlation between oxygen radical absorbance capacity (ORAC) values and total phenolic contents, however, type I did not correlate with total phenolic contents. It was suggested that type I might contain another types of antioxidant compounds in addition to phenolics and sulfides.</p> <p>Typhoons are frequent, and supply a large quantity of sea salts in Okinawa Island characterized by a maritime subtropical climate. Thus, salt tolerant cultivar is valuable for crop production in Okinawa. Secondly, we investigated salinity effect on growth, yield and quality of Welsh onion and Wakegi of Okinawa using seawater. Growth and yield parameters of 'Nakagusuku wakegi' were not significantly affected, but leaf tip burn decreased and soil and plant analyzer development (SPAD) value increased with the salt application. Total free amino acids contents increased with seawater application in all the tested plants.</p> <p>Further investigation of salinity effect on 'Nakagusuku wakegi' was conducted using different concentration of bittern (salt). None of the growth parameters was significantly influenced by the investigated salt concentrations. We found negative correlations between the rate of leaf tip burn and N content, and positive correlations between the SPAD value and N content. An increase in the salt concentration up to 1% bittern resulted in an increase in the proline content. In addition, the glucose and fructose contents increased in response to increasing salt concentrations. Our results suggest that the proline and sugar contents of Wakegi increase under saline conditions and function as osmolytes, thereby enabling the plant to survive. Seawater could be used to improve quality of Okinawan wakegi.</p>	