

Title Mechanical characteristics of garlic scapes for developing mechanical garlic bulbils harvester
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Abstract

Mechanical characteristics of flower stalks (scapes) of garlic such as shear forces, cutting force, and modulus of elasticity was analyzed as a preliminary research to develop a mechanical harvester of garlic bulbils. The average shear force of garlic scapes was 0.642 N and the maximum and minimum shear force was 1.42 and 0.25 N, respectively. The shear forces generally increased as the diameter of garlic scapes increased. There was no correlation between the modulus of elasticity and the diameter of garlic scapes and the average modulus of elasticity of garlic scapes was around $2.4 \times 10^7 \text{ N/m}^2$. There was also no correlation between the cutting force and the diameter of garlic scapes. As the downward speed of blade increased, the cutting force of garlic scapes decreased and reversed to increase. The cutting forces of the lower part garlic scapes were lower than those of the upper part. The range of cutting forces of the lower and the upper part of garlic scapes was 3.88-4.04 N and 4.29-4.93 N, respectively.