

Title Multi-stage vacuum cooling process of cabbage  
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### **Abstract**

Precooling is used to lower the temperature of the harvested agricultural products while vacuum cooling is usually adopted in the precooling of the leafy vegetables. However, when the usually known vacuum cooling technology is applied to the cabbage, its complex internal structure which is tightly wrapped. Thus, it often causes the cooling effect on the interior center to be rather poor. This paper proved that the multi-stage vacuum pressure reserving process is able to lower the surface and interior temperature of the cabbage effectively and uniformly. Additionally, in general vacuum cooling, when the vacuum chamber recovers the atmospheric pressure during the pressure-restoring process, the temperature of the cooled objects rises again. It is usually due to the entry of the high-temperature air from the external into the vacuum chamber. This paper discovered that this problem could be effectively relieved by cooling the external air with a condenser, and inducting the cooled air into the vacuum chamber during the pressure-restoring process. The experimental objects, besides the cabbage, also include the water spinach of the stem vegetables for comparison.