

## Assessment of thermal properties of hull-less pumpkin seeds using differential scanning calorimetry

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### INTRODUCTION & AIM

Nowadays, people are increasingly focusing on maintaining a healthy lifestyle and controlling what they eat. By choosing healthy and traditional snacks, we are able to avoid the negative consequences of regularly eating unhealthy food products. For this reason, one of the most valued products may be the oil rich - hull-less pumpkin. Seeds are a great alternative among other snacks available on the market, but they can also be used to enrich dishes with characteristic features. The seeds can be eaten in many forms: raw, dried, roasted or as an oil extracted from the seeds.

The aim of the research was the analysis of hull-less pumpkin seeds, including determining of the melting parameters using DSC thermal heating curves and the crystallization parameters using DSC cooling curves under nitrogen atmosphere.

### METHOD

Ten genetic varieties of hull-less pumpkin seeds were used to conduct the DSC heating and cooling analysis.

The analyses of heating/cooling curves was performed using a TA DSC Q200 differential scanning calorimeter under nitrogen atmosphere.

The powders were weighted in the amount of 10–15 mg and sealed in hermetic aluminium vessels. The samples were cooled to  $-60^{\circ}\text{C}$  and then heated to  $250\text{--}300^{\circ}\text{C}$  at a rate of  $5^{\circ}\text{C}/\text{min}$  for heating curves analysis.

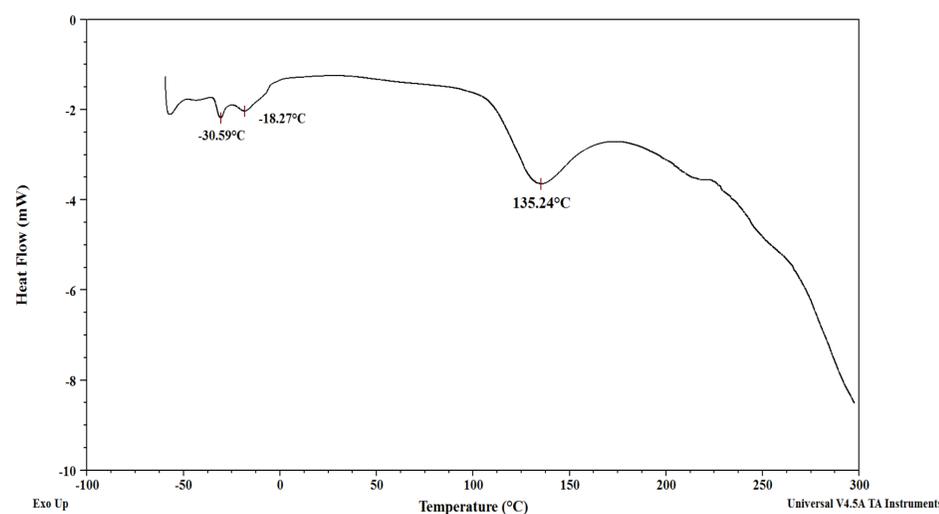
Cooling curves DSC were recorded by cooling samples at cooling rate of  $5^{\circ}\text{C}/\text{min}$  from temperature  $0^{\circ}\text{C}$  to  $-60^{\circ}\text{C}$ .

### RESULTS & DISCUSSION

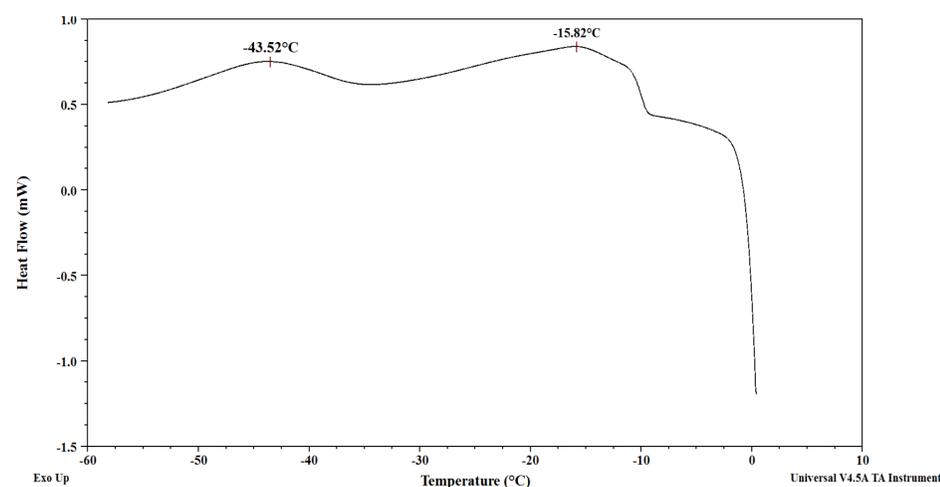
Two peaks present on the DSC heating curves of pumpkin seeds, were the evidence of low-melting triacylglycerols with polyunsaturated fatty acids (first peak), medium-melting fraction rich in triacylglycerols with monounsaturated and saturated fatty acids (second peak).

The third peak present on the heating DSC curves of pumpkin seeds was related to decomposition of low-molecular weight saccharides, poly- and oligosaccharides.

On crystallization curves two exothermic peaks were observed. Two peaks indicated the crystallization temperature of the oil contained in the hull-less pumpkin seeds.



Sample curve heating DSC hull-less pumpkin seed



Sample curve cooling DSC hull-less pumpkin seed

A negative temperature of peak on the heating curves indicated the presence of valuable unsaturated fatty acids. A lower temperature of peak was the evidence of the presence of fatty acids with a greater number of unsaturated bonds. A similar pattern was observed on the cooling curves in relation to the fat crystallization process.

### CONCLUSION

Analysis of DSC heating and cooling curves showed similarity of thermal profiles of all samples with respect to each other, which suggests correlation of their thermal properties and chemical composition.

### FUTURE WORK / REFERENCES

Devi, N.; Prasad, R.; Palmei G. Physico-chemical characterisation of pumpkin seeds. *Int J Chem Stud*, **2018**, 6 (5), 828-831.