EFFECT OF PLASMA JET TREATMENT ON LENTIL SEEDS WETTABILITY

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1. Introduction

Lentil (*Lens culinaris* Medik) has been one of the most cultivated annual food crops since antiquity. It is an important food source for human and animal nutrition because it contains high amount of protein, vitamins and mineral constituents. Pre-sowing treatment on seeds is generally required, since it influences directly the germination rate, time and growth development of the plants. The most employed traditional method is the chemical treatment, where seeds are immersed in acid, which is not an environmental friendly process due to it dangerous by-products [1, 2]. On the other hand, non-thermal plasma processing has been recently investigated in the field of agricultural science as an alternative to the traditional methods, since plasma has the advantage of producing uniform treatments, does not damage the seeds and it is harmless for the environment [3]. This work aims to study the effect of plasma jet treatment on lentil seeds wettability.

2. Experimental

Lentil seeds were employed for this work and a plasma jet terminating with a wide (horn-like) nozzle was used to treat the seeds. Plasma was generated by an AC power supply operating at 19 kHz, flushed with argon (1.2 L/min) and applied voltage of 12 kVp-p. Seeds were exposed to plasma for 20 s, 40 s, 60 s, 80 s and 100 s. Measurements of the water contact angle (WCA), surface free energy (SFE) and uptake water were conducted in order to evaluate the changes on the seeds wettability after plasma processing.

3. Results and Discussions

A decrease of WCA from 100˚(control) up to less than 40˚ after plasma exposure was obtained as illustrated in Fig. 1. On the other hand, Fig. 2 shows that there was a substantial increase of SFE from 17.8 mJ/m2 to more than 60 mJ/m2 after treatments. The uptake water experiment indicates that after 3 hours of water immersion plasma treated seeds absorbed around 15% more water than the control seeds. The decrease of WCA, increase of SFE and enhance of uptake water show that after plasma jet treatment the seeds surface became more hydrophilic, which could lead to better germination and increased growth rates of the seeds.

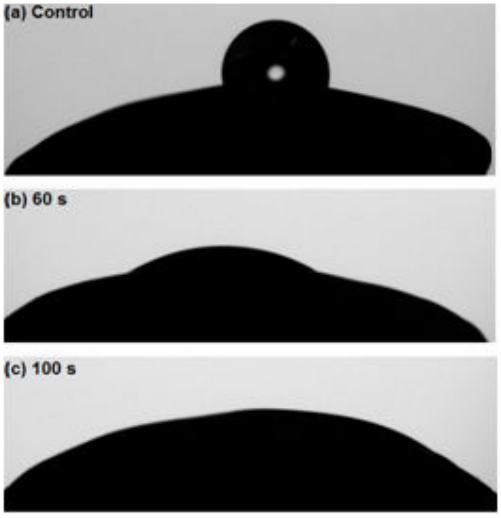

Fig. 1. *Water contact angle photos on lentil seeds.*

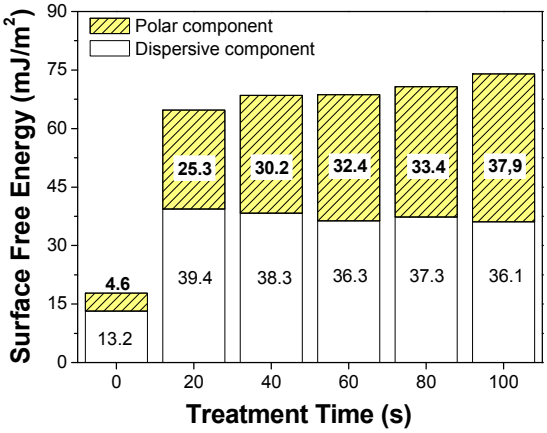

Fig. 2. *Surface free energy values.*

4. References

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Acknowledgments

This research was funded by CAPES.

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