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Eco-design of integrate system of drying and separating of olive residues in olive oil industry

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Objective: The objective of this research is optimizing a process of recycling residues called olive cake (stones) for renewable energy use and Pomace for animal feed industry use. This study includes a drying and separation of solid residues from pulp and store final product for an expedition to recommended user. Drying will proceed continuously in parallel with the existing production process of olive oil. The olive tree has been present in the Mediterranean since the last glaciations. The olive oil industry generates a significant amount of residues that impact not only the country but the entire planet by mainly polluting the soil. Their recycling is still partial for technical and economic reasons. However, in the majority of cases, the cost factor limits the use of these resources. On the other hand, residues with a high humidity of 45 to 55% cannot be stored indefinitely or converted into energy without drying. This dehumidification requires a high energy consumption to reach levels between 10 and 15% to be a source of renewable energy.

Material: We used a sample for the experimentation of a mass of 1200 kg of the residues of olive oil brought to a humidity of 53% close to the maximum value which is of the order of 54%, this sample is under an ambient temperature of 20°C.

Discussions: Technical: With this experimentation, we prepared a rich medium with dry performance where about an average of 15.94% of liquid is removed from 1.2 kg of olive cake residues with a vacuum pump working at power of 120 W.

Perspectives: The subject of our innovation (research) concerns an innovative combination in order to make profitable and optimize the process of drying. It consists of a combination of drying by vacuum with option of drying by solar energy.

| Tests | Volume removed water/liquid (ml) | Ratio % (total weight) Removed |
|--------------|-------------------------------------|-----------------------------------|
| Experience 1 | 195 | 16,3 |
| Experience 2 | 185 | 15,4 |
| Experience 3 | 200 | 17,4 |
| Experience 4 | 190 | 15,8 |
| Experience 5 | 190 | 15,8 |
| Average | 190 | 15,94 |
| Final type | 7.9095/0615 | 0.8532/1988 |

Table 1: result of the experimentation of the drying of olive oil residues by a vacuum system.

Biography

Abdellatif Lajdel has his expertise in mechanical construction of new plant. He is preparing for his PhD submission. He has a brevet (WO 2016/163866) on combined drying system of olive cake and has an experience in research, mechanical construction. He also has PMP certification from Mars 2012. He has experience in project management in industrial environment.

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