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Combining pectin and sunflower seed protein for the development of biodegradable films with potential application in food packaging

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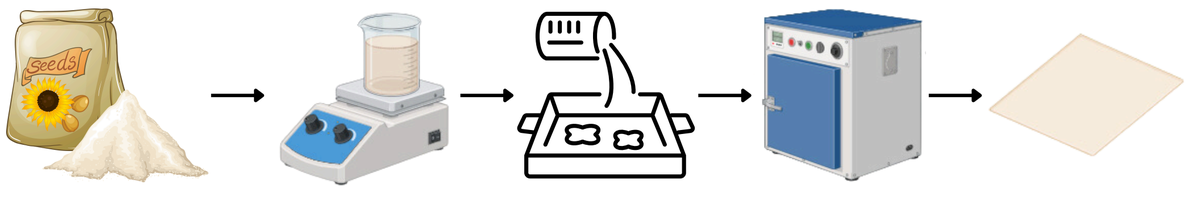
INTRODUCTION & AIM

This study aimed to develop and characterize biopolymeric films formulated from isolated sunflower seed protein (SSP) combined with commercial citrus pectin (CPEC) in different proportions.

METHOD

- **Film preparation**



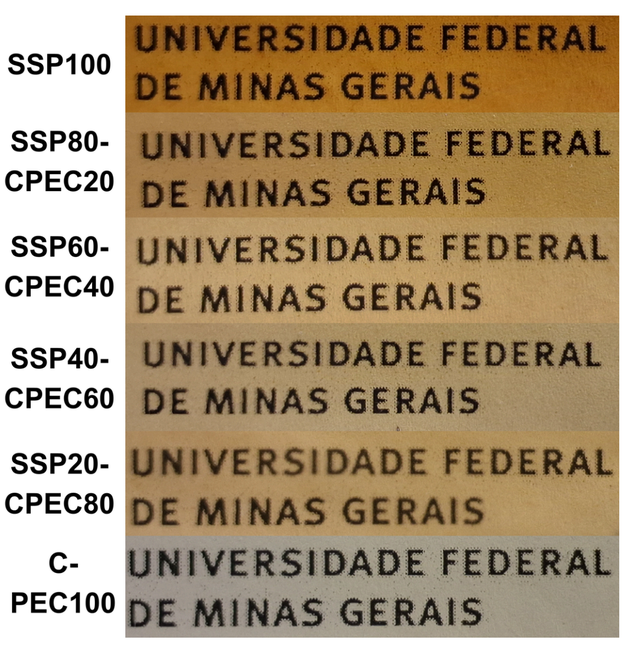
SSP:CPEC proportions: 1:4; 2:3; 3:2; 4:1

- **Caracterization**

Optical, Barrier and mechanical properties; and soil biodegradability

RESULTS & DISCUSSION

- **Optical properties**



c*: SSP80-20 and CPEC100 were the only samples that differed significantly from the others.

h: SSP100 showed no difference compared to the blends.

Opacity: only SSP40-60CPEC was considered opaque (opacity > 5).

- **Mechanical properties**

Tensile strength (MPa): highest for CPEC100 (13.12 ± 2.25); lowest for SSP100 (1.20 ± 0.10).

Elongation at break (%): highest for SSP100 (219.20 ± 29.10); lowest for CPEC100 (115.44 ± 2.36).

Elasticity modulus (MPa): highest for CPEC100 (296.50 ± 51.70); lowest for SSP100 (3.88 ± 0.75).

- **Barrier properties**

Water Vapor Permeability Rate (x 10^{-3} g/s.m^2): no significant difference between all samples.

Water Vapor Permeability (x10^{-3} g/s.m.Pa): highest for SSP40-CPEC60 (4.53 ± 0.20); lowest for CPEC100 and SSP80-CPEC20 (2.58 ± 0.07 and 2.81 ± 0.09).

Oxygen permeability (x10^{-9} g/s.mm^2): highest for SSP100 (4.16 ± 0.13); lowest for SSP80-CPEC20 and CPEC100 (3.85 ± 0.06 and 3.79 ± 0.05).

- **Soil biodegradability**

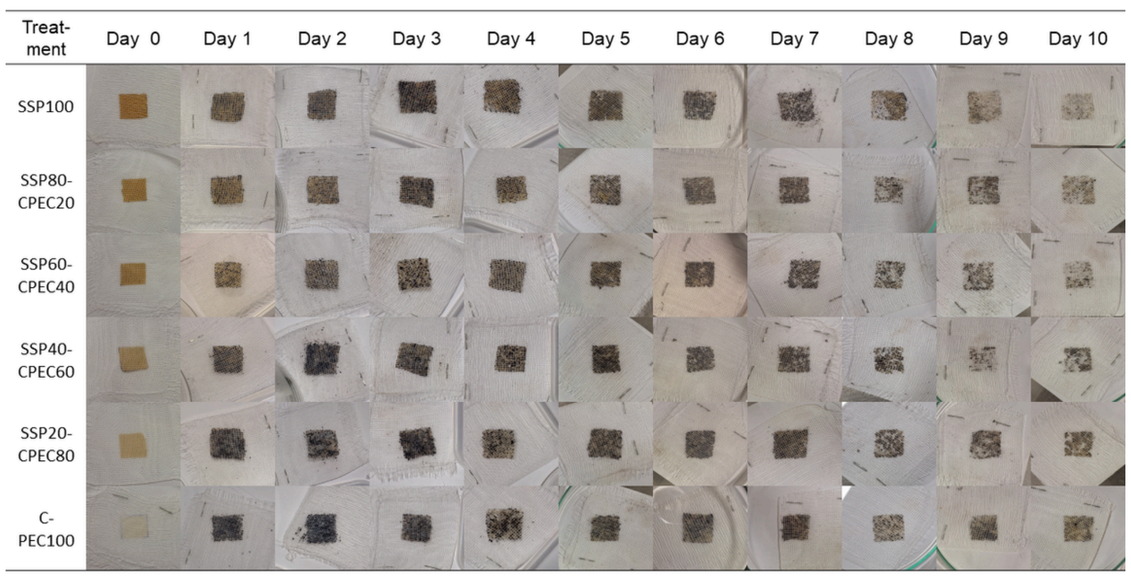


Figure 1 - Biodegradability results for the control and blend films

- **No linear correlation** between the pectin/protein **ratio** and **barrier or mechanical properties;**
- **Addition of pectin** led to films that were **more rigid and less flexible;**
- The film containing 80% protein and 20% pectin exhibited **the lowest permeability values** (except WVPR);
- All the prepared films showed complete soil degradation after 10 days of exposure, except those with higher amounts of pectin (80 and 100%).

CONCLUSION

It was concluded that it is feasible to produce films based on pectin combined with protein isolated from sunflower seeds, representing a sustainable alternative to conventional plastic packaging.

ACKNOWLEDGEMENTS

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