Transforming Okara into a high value byproduct: enzymatic production and molecular characterization of antifungal bioactive peptides

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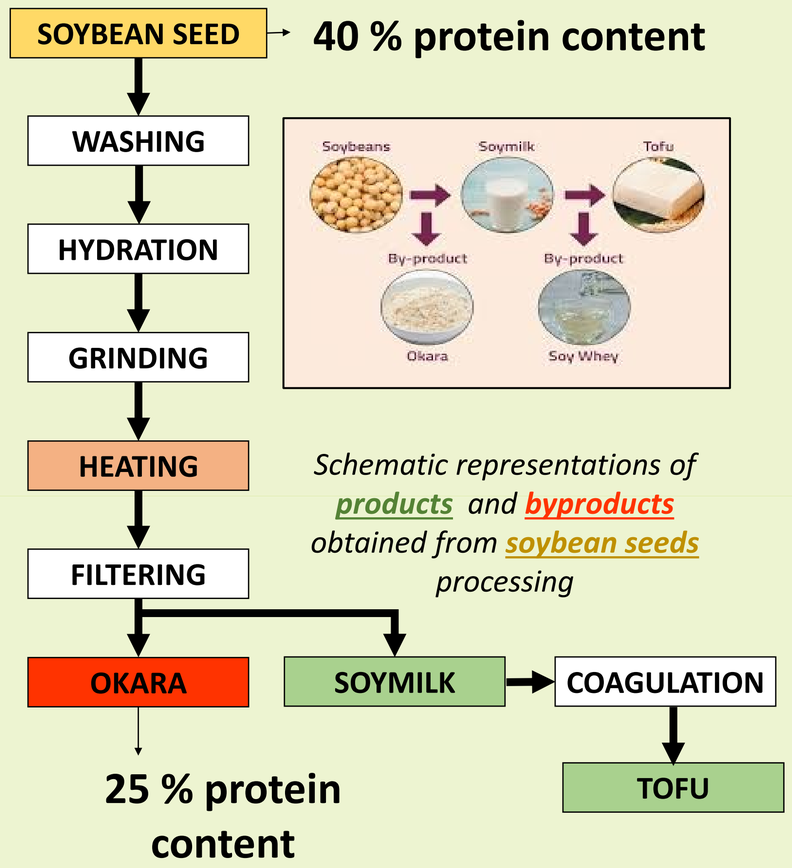
Okara is a byproduct generated in huge amounts during soymilk or tofu production, posing a significant disposal problem since, up to now, it has been mainly used as such in animal feeds or as industrial waste. Okara's high protein content (25-40% on a dry weight basis), makes this byproduct interesting. A rapid and economic procedure to isolate proteins from okara and to produce an enzymatic proteolyzed was developed and a dose response inhibitory activity was established against fungi belonging to *Fusarium* genus[1].

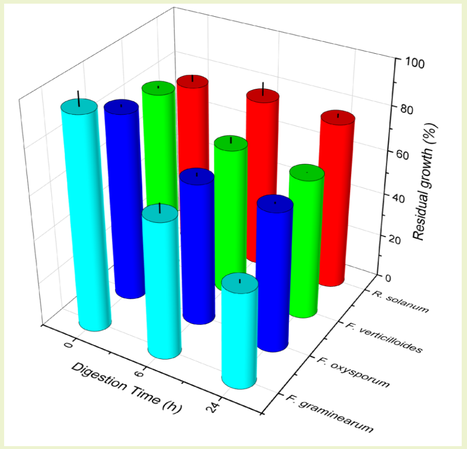
AIM

To characterize the active enzymatic proteolyzed product in order to isolate the potential bioactive peptide(s)

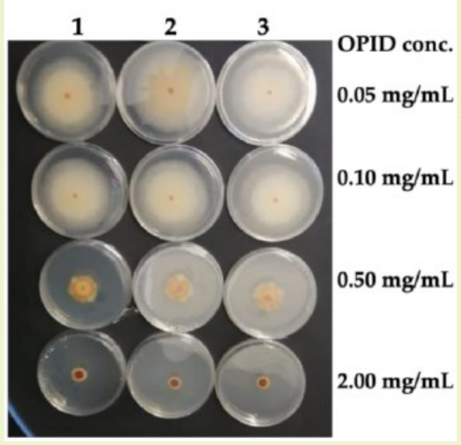
BACKGROUND



Schematic representations of products and byproducts obtained from soybean seeds processing

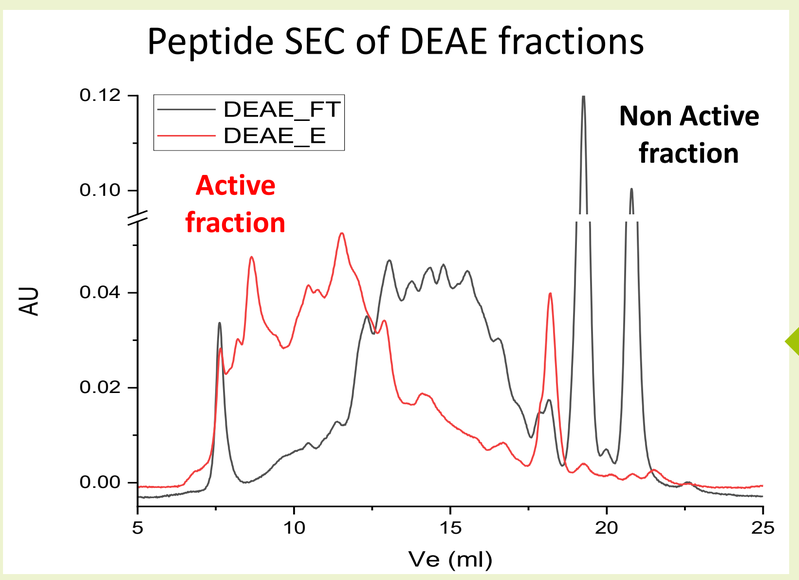


Time depedent inhibition effect



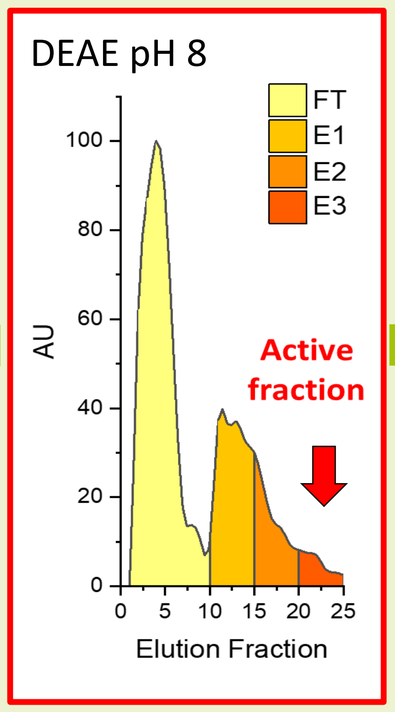
Dose-effect growth inhibition on F. graminearum (OPID = proteolyzed okara)

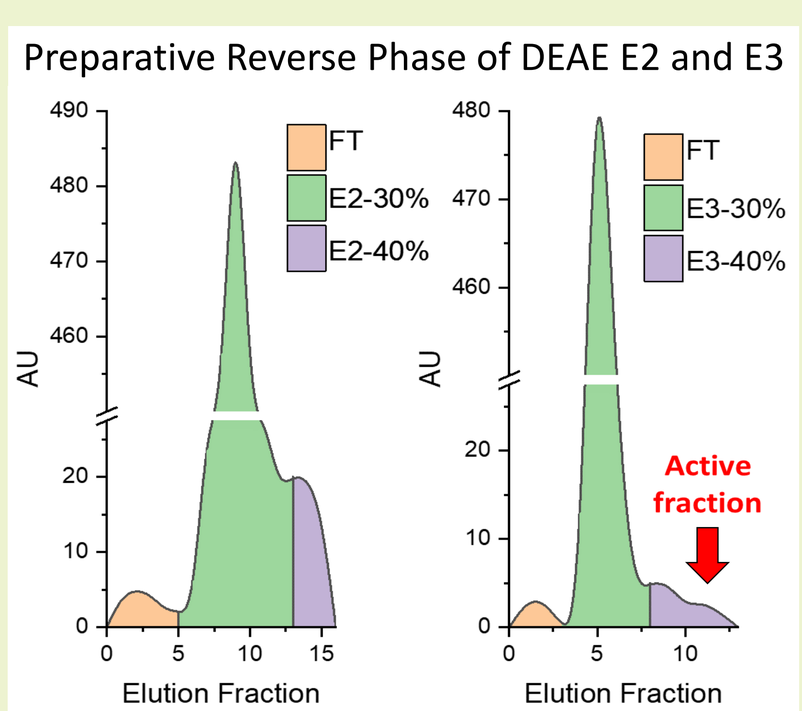
ENRICHMENT AND ISOLATION OF THE ACTIVE FRACTION



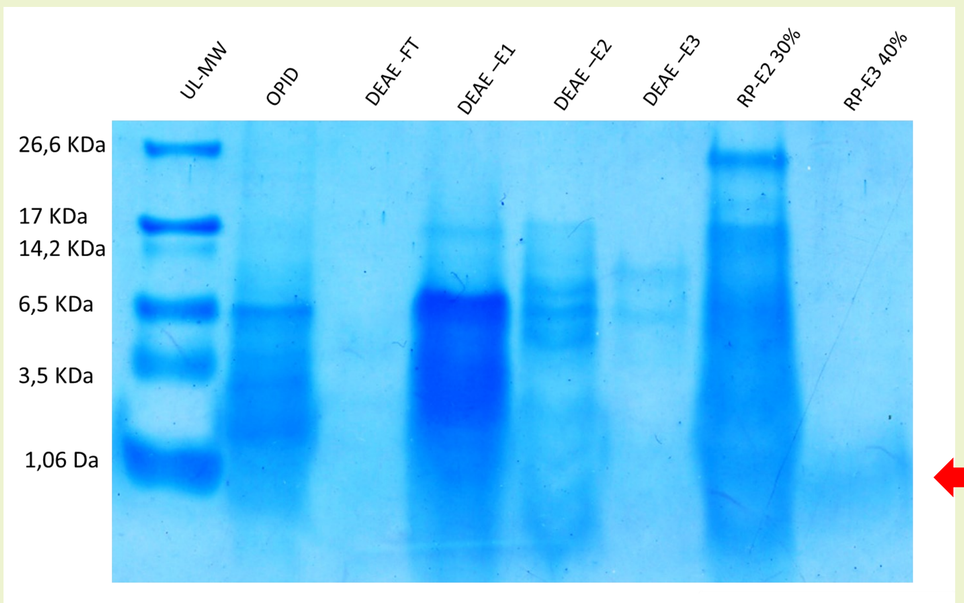
Active fraction mainly > 2 kDa

Non active fraction mainly < 2 kDa

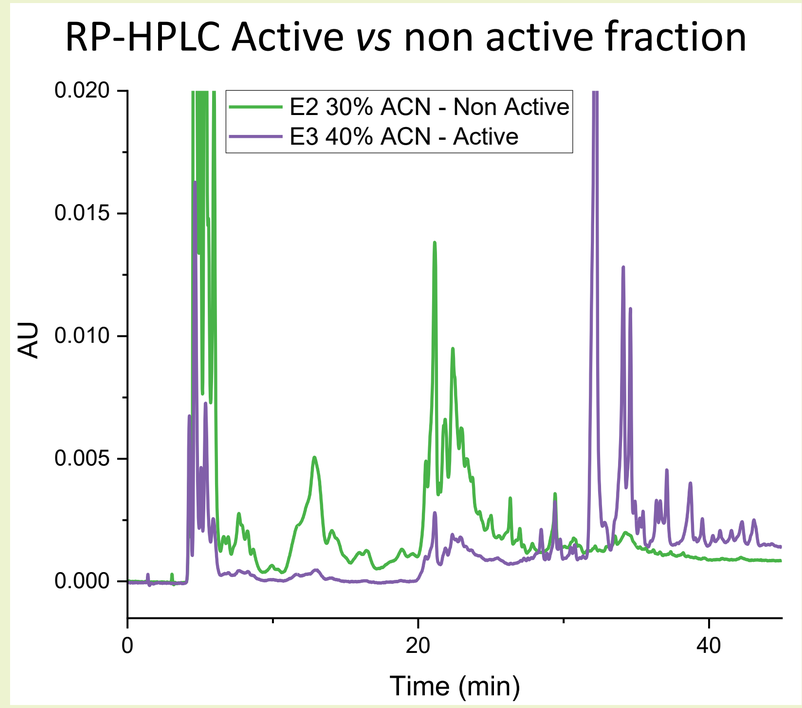




Active fraction is isolated from DEAE fraction E3 with 40 % ACN



Low molecular weights SDS-PAGE analysis reveals peptides of about 1 kDa MW in the final enriched **active fraction**

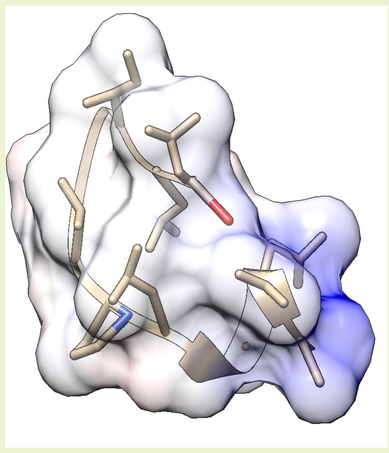


Peptide fingerprinting reveals few peptides in the enriched **active fraction**

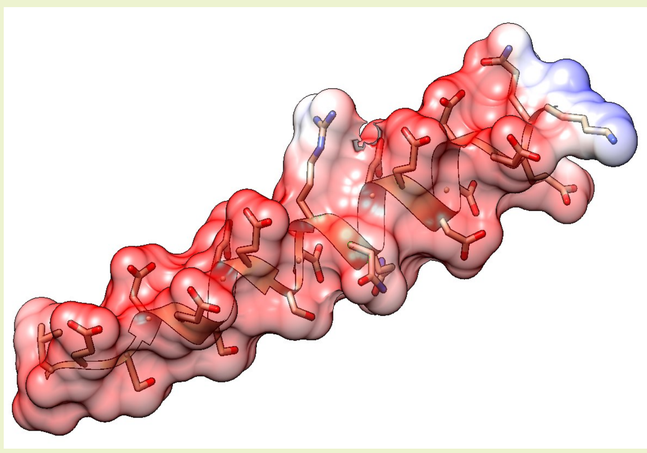
CONCLUSIONS

- Proteins can be efficiently recovered from Okara and be used for an easy and scalable procedure to produce antifungal compounds active against *Fusarium spp.*
- Isolation of active fraction allowed the identification of different potential bioactive candidates.
- A field-derived food waste is transformed into a source of valuable compounds, to be used in field protection of valuable crops for human and animal nutrition.

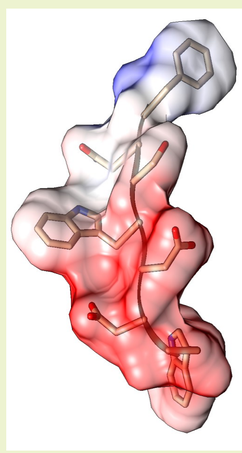
Mass Spectrometry analyses revealed different candidates with different chemical properties that could have a potential antifungal bioactivity



Candidate A



Candidate B



Candidate C

[1] De Benedetti S et al. (2021) Molecules 26, 4858.