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ORIGINAL ARTICLE

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Chemical and functional characterization of major protein fractions extracted from nontoxic *Jatropha curcas* byproduct meals

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Abstract

Jatropha curcas seeds are a suitable source of oil for biofuel, among other use. A protein-rich meal is obtained after oilseed extraction. The goals of this study were to determine the physicochemical and functional properties of a nontoxic genotype of *J. curcas* defatted meal (JCDM) and the seed storage protein fractions to identify future applications. Both glutelin and globulin were the predominant protein fractions obtained from JCDM (42.03 and 20.17 g/100 g of protein, respectively). Leucine, phenylalanine + tyrosine, and histidine content of JCDM and protein fractions met the Food and Agriculture Organization/World Health Organization recommendation for children. The protein solubility (PS) profiles showed minimum values (5.3%–59.7%) at pH 5–6 and maximum at pH 2 (79.7%–81.6%) and above pH 10 (84.6%–89.8%). These findings suggest that JCDM proteins could be used in the formulation of juice or protein-based beverages. All the proteins showed the highest values for foam expansion (231%–285%) at pH 9. JCDM and the albumin fraction formed highly stable foams at pH 9, while the globulin and glutelin foams were stable at pH 3 and 2, respectively. Protein with stable foams, like those from jatropha are suitable for application in ice cream, mousse, among others. The emulsion activity index had similar behavior as foam expansion, but did not follow a specific trend. Thus, the proteins are suitable for use in salad dressing, sausages, comminuted meats, and mayonnaise. Taken together, JCDM protein and its soluble protein fractions have strong promise as alternative proteins for food structuring.

KEYWORDS
alternative proteins, functional properties, globulin, glutelin, *Jatropha curcas*, seed storage protein

INTRODUCTION

During the last two decades, the increased interest in *Jatropha curcas* L., a plant of the *Euphorbiaceae* family, is due to its high seed oil content (40%–60%) and its use as an alternative biodiesel source. For the oil extraction, the first step is the separation of the seed coat and the kernel. It has been reported that the

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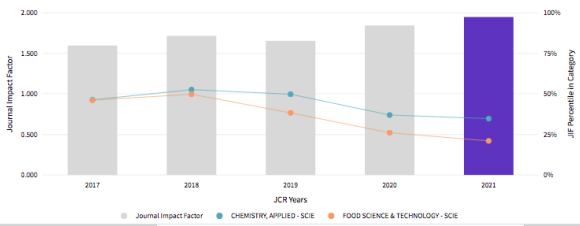

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Olive Oil Processing: Current Knowledge, Literature Gaps, and Future Perspectives	7
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Effect of Roasting on Flaxseed Oil Quality and Stability	7

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EDITION
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CATEGORY
CHEMISTRY, APPLIED
48/73

JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTILE
2021	48/73	Q3	34.93
2020	47/74	Q3	37.16
2019	36/71	Q3	50.00
2018	34/71	Q2	52.82
2017	39/72	Q3	46.53
2016	39/72	Q3	46.53

EDITION
Science Citation Index Expanded (SCIE)

CATEGORY
FOOD SCIENCE & TECHNOLOGY
114/144

JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTILE
2021	114/144	Q4	21.18
2020	106/143	Q3	26.22
2019	86/139	Q3	38.49
2018	68/135	Q3	50.00
2017	72/133	Q3	46.24
2016	65/130	Q2	50.38

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CATEGORY
CHEMISTRY, APPLIED
48/75

JCR YEAR	JCI RANK	JCI QUARTILE	JCI PERCENTILE
2021	48/75	Q3	36.67
2020	40/77	Q3	48.70
2019	33/75	Q2	56.67
2018	33/74	Q2	56.08
2017	34/73	Q2	54.11

CATEGORY
FOOD SCIENCE & TECHNOLOGY
120/165

JCR YEAR	JCI RANK	JCI QUARTILE	JCI PERCENTILE
2021	120/165	Q3	27.58
2020	105/163	Q3	35.89
2019	94/162	Q3	42.28
2018	86/162	Q3	47.22
2017	80/157	Q3	49.36