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# Formulation of nanocarriers composed of millet protein and tocopherols to control bioavailability of lipophilic food components

**Sepideh Khorasani[1], Marziyeh Danaei[2]**
[1]Shahid Bahonar University of Kerman, Iran
[2]Monash University LPO, Australia

Millet is a general word used to refer to a wide range of small-seeded annual grasses, which have been grown for thousands of years in different parts of the world. They are still the main source of food and nutrition in some countries in Africa and Asia. Millet seeds are rich in oil and contain essential fatty acids and essential amino acids as well as a number of minerals. We have been formulating nanocarrier systems employing proso millet protein and different tocopherol homologues for the nanoencapsulation of hydrophobic compounds. These formulations possess added nutritional value, are cost-effective and are able to increase the bioavailability of the encapsulated material. Proso millet protein was extracted by either wet milling or ethanol and then used as the wall material together with tocopherol homologues to encapsulate curcumin and omega fatty acids. The formulated nanocarrier systems depicted spherical morphologies and had diameters in the range of 180–240nm and polydispersity index (PdI) around 0.2–0.3. The entrapment efficiency for omega fatty acids ranged from 47.5% to 68.5% and for curcumin ranged from 34.0% to 56.5%. It was observed that millet protein extracted by ethanol exhibited better performance than that extracted by the wet milling process. The encapsulated omega fatty acids and curcumin exhibited a lower degradation rate than corresponding free compounds at 60°C. The encapsulation showed no negative effect on the antioxidant activity of curcumin as assessed by the DPPH and ABTS assays. In conclusion, results of the present study suggest that the composite nanocarrier systems formulated using millet protein and different tocopherol homologues have great potential for the nanoencapsulation of lipophilic compounds and can increase the bioavailability of food compounds significantly.

| | Oats | Corn | Quinoa | Millet | Brown Rice | Potato |
|---|---|---|---|---|---|---|
| Tryptophan | 0.060 | 0.024 | 0.043 | 0.032 | 0.027 | 0.033 |
| Threonine | 0.148 | 0.138 | 0.109 | 0.095 | 0.076 | 0.078 |
| Isoleucine | 0.179 | 0.138 | 0.130 | 0.124 | 0.087 | 0.087 |
| Leucine | 0.331 | 0.372 | 0.217 | 0.375 | 0.170 | 0.129 |
| Lysine | 0.161 | 0.147 | 0.198 | 0.056 | 0.075 | 0.131 |
| Methionine | 0.080 | 0.072 | 0.080 | 0.059 | 0.046 | 0.034 |
| Phenylalanine | 0.231 | 0.161 | 0.154 | 0.155 | 0.106 | 0.095 |
| Tyrosine | 0.148 | 0.131 | 0.069 | 0.091 | 0.077 | 0.079 |
| Valine | 0.242 | 0.190 | 0.154 | 0.155 | 0.121 | 0.121 |
| Histidine | 0.104 | 0.095 | 0.105 | 0.063 | 0.053 | 0.047 |

Comparison of essential amino acid contents of different grains.

## Biography

Sepideh Khorasani is Assistant Professor in the Department of Food Science and Technology, Shahid-Bahonar University, Kerman, Iran. She is interested in research and development in the field of Clinical Pharmacology, Food Processing and Food Nanotechnology. She has been supervising scientific projects on the Post Harvest of different agricultural products using herbal and plant-derived compounds. She has several years of teaching and lecturing experience as well as supervision of postgraduate research students.

khorasany@uk.ac.ir

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