



ORIGINAL ARTICLE

Effect of microwave pre-treatment on quality parameters in Indian mustard

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Abstract Demand for edible oil from crops like groundnut, mustard and soybean, is increasing and likely to increase further. In this regard, Indian mustard seeds were treated with microwaves (MW), to investigate the possibility of enhancing oil yield and nutritional content. MW pre-treatment was given to the seeds of two Indian mustard varieties i.e. PM21 (V_1) and PDZ1 (V_2) for 0, 2, 4 and 6 min (H_0 , H_2 , H_4 and H_6 min respectively). MW treatment with increasing exposure time showed a linear reduction in the glucosinolate and erucic acid content with concomitant increase in oil yield and moisture loss in both the varieties, as evident from correlation and principal component analysis. Antioxidant capacity has increased with the reduction in phytic acid content (1.82) in V_2 at 6 min exposure time with respect to untreated control. Free radical scavenging activity was improved with increasing MW treatment in both the varieties. Therefore, from the obtained results, it is advisable to treat mustard seeds with MW before extraction of oil, because it gives a relatively good oil yield, with enhanced nutritional factors. Moreover, microwaving was effective in reducing glucosinolates and erucic acid also.

Keywords Indian mustard · Microwave irradiation · Glucosinolates · Erucic acid · Phytic acid · Antioxidants

Introduction

According to agricultural statistics (2017), Indian-mustard ranks third in terms of export after Canada and China with per cent share of 8.8 from the production of 7.98 million tonnes in the financial year 2016–2017 (http://agricoop.nic.in/sites/default/files/pocketbook_0.pdf). This crop has emerged as a nutritionally rich due to its superior edible oil with 2:1 ratio of omega-6 to omega-3 fatty acids and protein rich seed meal for animal feed (Jesch and Carr 2017). Nutritional assessment of Indian-mustard seed is acknowledged by its oil content, fatty acid profile, certain nutritional and anti-nutritional factors including glucosinolates and phytic acid. Stability of mustard oil largely depends on the presence of natural antioxidants which are mostly phenolics, tocopherols, phytosterols and β -carotene. These components essentially provide protection to polyunsaturated fats from oxidation (Sebei et al. 2007). Studies have shown that consumption of oils that are naturally rich in antioxidants is associated with a reduced risk of many cardiac diseases, obesity and cancer (Jan et al. 2018). Glucosinolates (plant thioglucosides) are found primarily among the members of *Brassicaceae* family. It is responsible for the characteristic pungency of Indian mustard oil. Cleavage products of glucosinolates hydrolysis are known to be detrimental to animal health but on the