



# Development of energy bar by adding underutilized Chironji (*Buchanania lanzan*) seeds

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## ABSTRACT

The research aimed to develop an energy bar by adding underutilized Chironji (*Buchanania lanzan*) seeds. Chironji seeds, Oats, Puffed Rice, Dates, Condensed Milk, Jaggery, Butter, Raisins, and Almonds were combined to make the energy bars. Chironji seeds and Condensed Milk were added as major ingredients for the preparation of energy bars. Date paste was added to increase flavor and as a binding agent. Butter and jaggery were added as preservatives and sweeteners, respectively. Final bars were preserved for nutritional and sensory analysis. Chironji seeds and Condensed Milk were used in varied proportions and a total of five samples were prepared. The developed bars were analyzed for physicochemical properties such as moisture content ( $8.00 \pm 2.00\%$  to  $12.00 \pm 2.00\%$ ), ash content ( $1.33 \pm 1.16\%$  to  $3.33 \pm 1.16\%$ ), fat content ( $24.00 \pm 2.00\%$  to  $27.33 \pm 1.16\%$ ), protein content ( $10.57 \pm 0.12\%$  to  $12.93 \pm 0.58\%$ ), TSS (total soluble solids) ( $7.33 \pm 0.58^\circ$  to  $8.00 \pm 1.00^\circ$ ), and pH ( $5.26 \pm 0.01$ – $5.36 \pm 0.01$ ). The  $L^*$  value ( $51.23 \pm 0.25$ – $74.17 \pm 0.21$ ),  $a^*$  value ( $7.90 \pm 0.20$ – $21.23 \pm 0.25$ ), and  $b^*$  value ( $27.27 \pm 0.25$ – $52.27 \pm 0.25$ ) of the bar samples were determined using the CIE lab. Energy bars were rated on the 9-point hedonic scale for sensory evaluation and the attributes of color ( $7.67 \pm 0.58$ – $8.67 \pm 0.58$ ), texture ( $8.33 \pm 0.58$ – $9.00 \pm 0.00$ ), taste ( $7.67 \pm 0.58$ – $9.00 \pm 0.00$ ), aroma ( $8.00 \pm 0.00$ – $8.33 \pm 0.58$ ), and overall acceptability ( $8.17 \pm 0.14$ – $8.83 \pm 0.14$ ) were measured. Therefore, Chironji seeds are a promising source for developing energy bars.

## 1. Introduction

Several fruit crops and seeds are produced year-round in India. Despite their nutritional and therapeutic benefits, they mostly remain unnoticed and thus, are underutilized. Majority of underutilized fruits and seeds are native to India (Pal, Abrol, Singh et al., 2019). If demand for plant and crop attributes grows, underutilized crops can overcome the barriers to increased production and utilization, and the potential of a crop can improve diets and production systems. The cause of underutilization of several fruits, crops and seeds is dependent upon its location. In India, chironji seeds are a common underutilized seed that has numerous health benefits but is exclusively used in sweet dishes of Indian cuisines. Chironji, also known as *Buchanania Lanzan*, is a dry fruit native to the Indian subcontinent and a member of the Anacardiaceae family (Prasad, 2020). It is served as a cooking spice and dry fruit in sweets, kheer, meat, korma, and eaten in the raw or roasted form (Rajput et al., 2018). It is high in protein (19.0 g), fat (59.1 g),

carbohydrates (12.1 g) and dietary fiber (3.8 g), and is also high in calories. It is also a good source of phosphorus (528.0 mg), calcium (279 mg), iron (8.5 mg) and it provides 656 Kcal (Neeraj et al., 2020). Chironji is high in calories as well as high in protein and dietary fiber, so it will satisfy hunger and keep one away from overeating. It is also used to cure a range of diseases in traditional medicine. Vitamin C, B<sub>1</sub>, B<sub>2</sub>, and niacin (Khattoon et al., 2015) are some of the vitamins found in Chironji and are also known to fulfill the energy requirements of a body (Siddiqui et al., 2014).

Nutri-bars are nutritious snacks for athletes that help them build stamina and maintain their desired weight while also providing them with an adequate daily intake of all nutrients. Athletes in sports, adolescents, and children who attend school are among the primary consumers of these products ((Jabeen et al., 2021). Given these benefits, a new product in the form of an energy bar with chironji as a key ingredient was developed. However, the use of proteins, sugars, fats, and other ingredients can influence the physicochemical and sensorial

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