This research is focused on the characterization of Njangsa seed oil, which is abundant in alpha-eleostearic acid. The fatty acid and its isomers have been demonstrated to improve cardiovascular function, reduce adiposity, reverse oxidative stress induced by heavy metal intoxication, and fight certain tumors. The oil is also a major source of phytosterols and tocopherols. Ongoing research is looking into the oxidative stability of the oil in a model food system. It is expected that the successful incorporation of this oil in the diet will in no doubt lead to healthy outcomes.

Project Name

Chemical Characterization of Njangsa (*Ricinodendron Heudelotii*) Seed Oil, and Its Oxidative Stability

Who cares and why?

The human and economic tolls of chronic diseases such as cancer, cardiovascular disease and obesity have been a grave cause of concern globally, and more especially in the western world where diet is a major contributing factor. Heart disease and cancer, which are the top two causes of death in the United States, accounted for over half of all deaths in 2011, according to the Centers for Disease Control and Prevention. A report by the American Cancer Society showed that there were 13.7 million Americans living with cancer in 2012, a total of 1,660,290 new cases of cancer in 2013, and 580,350 deaths in the same year. The most recent update from the American Heart Association (AHA) puts the number of cardiovascular deaths in the US in the year 2010 at 787,000, and about 86.1 million Americans were living with some form of cardiovascular disease. Furthermore, the economic cost of cardiovascular diseases and stroke due to health expenditures and loss of productivity totaled more than $315 billion in that year.

Recent investigations have revealed that a group of fatty acids called conjugated linolenic acids (CLnA), which are concentrated in seed oils of pomegranate, bitter gourd, pot marigold, and Ricinodendron heudelotii (Njangsa), have positive benefits on certain physiological processes, and their inclusion in the diet may be desirable. These fatty acids have been shown to possess antitumor properties, improve cardiovascular functions, reduce adiposity and reverse oxidative stress due to heavy metal poisoning. Isomers of CLnA include α-eleostearic (c9,t11,t13-octadecatrienoic acid), which accounts for more than 60% of total fatty acids in bitter melon seed, and about 52% in Ricinodendron heudelotii seed. Other isomers include punicic, calendic and jicaric acids. Of the isomers, α-eleostearic (α-ESA) is the most potent due to its higher trans content, and its activity is about 10-fold higher.

What has the project done so far?

Since very little is known of Njangsa seed oil (NSO) with respect to its chemical composition, our first objective was to chemically profile this oil. Our work has shown that unsaturated fatty acids account for about 88% if total fatty acids, of which the most prevalent is alpha-eleostearic acid (44%), followed by linolenic acid (25.8%). Modest amounts of two other conjugated linolenic acid isomers were also determined. However, their exact identities are yet to be established. Our work has also shown that NSO could be a commercial source of phytosterols since it contains more phytosterols than soybean on a weight-by-weight basis.

Ongoing investigation is focused on the assessment of the oxidative stability of the oil in a model food system comprising of 50% microcrystalline cellulose, 40% glycerol, 10% NSO with or without 200 ppm antioxidant (oil basis) and iron added to a level of 50 ppm (oil basis). Our aim is to develop a kinetic model that can be used for predicting the shelf life of NSO in a food matrix.

Impact Statement

The successful characterization of Njangsa seed oil, which contains significant amounts of the physiologically beneficial alpha-eleostearic acid, is expected to lead to the incorporation of the oil into a variety of foods. These physiological benefits include antitumor property, promotion of proper cardiovascular functions, reversal of oxidative stress induced by heavy metal poisoning, and reduction in adiposity. The above physiological benefits suggest that Njangsa seed oil can be used as a dietary constituent for the prevention of cancer, cardiovascular disease and stroke, and obesity.

What research is needed?

Further research is needed to concentrate alpha-eleostearic acid from NSO for use in dietary supplements. Additionally, we are synthesizing beta-sitosteryl alpha-eleostearate for incorporation into reduced-cholesterol products to improve their consistencies.

Want to know more?

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Strategic Priority – plant products; health and nutrition

Additional links: http://www.umes.edu/ard/Default.aspx?id=46285

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