KINEMA

(Jyoti Prakash Tamang*)

***Kinema* of India, Nepal and Bhutan**

The fermented food:

Kinema is an ethnic fermented soybean food which is a sticky, slightly alkaline product with an ammoniacal flavour produced by natural fermentation. *Kinema* is similar to *natto* of Japan, *cheonggokjang* of Korea, *thua nao* of Thailand, *pe poke* of Myanmar and *sieng* of Cambodia.

Where is it found?

Kinema is prepared and predominantly consumed in the Darjeeling hills and Sikkim in India, eastern regions of Nepal and southern regions of Bhutan.

What are its ingredients?

Soybean (*Glycine max*.) seeds, yellow and brown local varieties.

How do we make it?

Dry seeds of soybeans are selected, washed, soaked overnight (8-10 h) in water. Soaked soybean seeds are transferred to a container with fresh water and boiled for 2-3 h until they are soft. Excess water is drained off and the cooked soybean seeds are added to a wooden mortar in which they are cracked lightly by a wooden pestle to split the cotyledons. About 1 % of firewood ash is added directly to the cooked soybeans and mixed thoroughly to maintain the alkaline condition of the product. Soybean grits are placed in a bamboo basket lined with locally grown fresh fern (called *Glaphylopteriolopsis erubescens*). The basket is covered in a jute bag and left to ferment naturally at ambient temperatures (25-40^{o} C) for 1-3 days above an earthen kitchen oven. During summer, the fermentation time may require 1-2 days, while in winter it may require 2-3 days. The shelf-life of freshly prepared *kinema* is 2-3 days in summer and a maximum of a week in

winter without refrigeration. It may be prolonged by drying in the sun for 2-3 days. Dried *kinema* is stored for several months at room temperature. This unique knowledge of *kinema*-making has been protected as a hereditary right and passed down from mothers to daughters.

The microbiology of the process:
Bacillus subtilis, a rod-shaped bacterium is the functional bacterium for fermentation of soybeans into *kinema*. Other bacteria present in *kinema* are *Bacillus glycinifermentans*, *B. cereus*, *B. licheniformis*, *B. thermoamylovorans*, *B. coagulans*, *B. circulans*, *B. paralicheniformis* and *Brevibacillus borstelensis*.

How/when do we use and enjoy it?
Kinema is eaten as curry with steamed rice. Fresh *kinema* is fried in vegetable oil, with chopped onions, tomatoes and turmeric powder. Salt and sliced green chillies are added and fried for 3-5 min. A little water is added to make thick gravy, and cooked for 5-7 min then the *kinema* curry is ready for serving with steamed rice. Dried *kinema* is sometimes mixed with leafy vegetables to make a mixed curry.

Variations, regional variations:
Kinema is prepared and eaten by the Nepali/Gorkha community of India (Darjeeling hills and Sikkim), Nepal and Bhutan. *Kinema* is similar to other Indian sticky fermented soybean foods such as *hawaijar* of Manipur, *axone/aakhonii* of Nagaland, *bekan,* of Mizoram, *bemerthu* and *bekanthu* of Assam, *bezeithu* of Tripura, *peruñyaan, peron, paeha/peha* and *grep chhurpi* of Arunachal Pradesh, *and tungrymbai* of Meghalaya.

Beneficial properties:
Kinema is the cheapest source of plant protein when compared to milk and animal products, on the basis of protein cost per kg. During the process of *kinema* production, soya-proteins are hydrolyzed by proteolytic enzymes produced by *Bacillus subtilis* into bio-peptides and amino acids which enhance digestibility. *Kinema* is rich in vitamins of the B-complex (B2, B3, B5, B6, and B7), Vitamin K, soyasaponin III, isoflavones, bioactive compounds, immunomodulators, linoleic acid, an essential fatty acids. *Kinema* has many health-promoting benefits including antioxidant, cholesterol-lowering effect, anti-cancer activities, anti-inflammatory effect, antiviral activities, anti-thrombolytic property.
Bacillus species present in *kinema* produce poly-γ-glutamic acid (γ-PGA) as a sticky and viscous material during natural fermentation of soybeans, which is usually preferred as quality criterion for fermented soybean foods by the consumers. The γ-PGA is a polymer which is composed of D- and L-glutamic acid units and has several bio-functional properties and health benefits to consumers.

Cultural roots and importance
The cultural root of *kinema* consumption might have originated in east Nepal around 3000 years ago during the Kirat dynasty. The word *kinema* is believed to have derived from the word *kinamba* of the Limboo (one of the oldest communities of Kirat races in Nepal) language (*ki* means fermented and *namba* means flavour).

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