

Edamame:

A rich source of protein for human nutrition

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Unlike plants, human being can not synthesize its own food; it has to rely on other sources such as plants and animals for meeting its food requirement. It has been reported that more than 65% of protein and more than 80% of food energy requirement of human body is met with the food of plant origin. Field crops (such as cereals, pulses, millets, etc.), fruits and vegetables are the primary source of plant-origin nutrients including proteins, vitamins, minerals, anti-oxidants, fibre, etc. Grossly, cereals provide carbohydrates, pulses provide protein and the fruits and vegetable supply minerals, vitamins, anti-oxidants, etc. Among the pulses and other crop plants, soybean is the richest source of protein (38-45%). The soy-protein is considered as healthy as it contains almost all the essential amino acids needed for human health and animal nutrition. Soybean also contains 18-22% vegetable oil rich in mono- and poly-unsaturated fatty acids viz., oleic, linoleic and linolenic acids.

Key words: Edamame, Protein source, Vegetable soybean

SOYBEAN contains lesser oil than protein, but it is primarily used as oilseed crop in our country. The de-oiled cake, which is rich in dietary protein, is exported as animal feed. Had the de-oiled cake been made edible and consumed locally, it would have certainly helped fighting protein-energy malnutrition rampant in our country. Grain soybean is now grown in more than 10 million hectares, primarily in Madhya Pradesh, Maharashtra and Rajasthan. However, vegetable soybean is still not very popular among the growers and consumers.

Edamame

In botanical terms, edamame or vegetable soybean is no different



Pods of Edamame in growing stage

from the grain soybean [*Glycine max* (L.) Merr.]. The difference has come up only from the stage of harvest; grain soybean is harvested when the seeds are fully matured while the vegetable soybean is harvested at immature stage (R6 stage) when the pods are green. The grain soybeans are used to extract oil or make soy-based products while the vegetable soybeans are consumed as green vegetable, raw or cooked. The grain soybean seeds are dry, small and hard while the vegetable soybean seeds are fresh, large (>30g/100 dry seed), green, sweet in taste, and more tender than grain soybean. Unlike grain soybean, immature pods of vegetable soybeans are boiled in mildly salted



water; seeds are extracted from the pods and are consumed as fresh vegetable. Although soybean is now grown worldwide, edamame or vegetable soybean is highly popular in East-Asian countries mainly China, Japan, Korea, etc. where it has been in consumption for centuries. However, it is now making headway to other countries of the world as an alternative vegetable and nutritious food.

Nutrition and health benefits

Nutritionally, the edamame is highly rich in protein, carbohydrates, mono- and poly-unsaturated fatty acid, vitamins, iron, zinc, calcium, phosphorus, fiber, folate, magnesium, potassium, tocopherol, isoflavones and other beneficial phytochemicals. It has become a close contender to green peas which is highly popular among the Indian consumers. However, the edamame has been reported to contain 60% more calcium and twice the phosphorus and potassium levels of green peas. The cooked edamame contains the highest net protein utilization value among all the soy-products. Being rich in isoflavone content, soybean is claimed to possess cancer prevention and suppression properties as well. Besides, frozen edamame controls appetite and hence found application as weight looser in human being. Edamame contains about 53.43% linoleic and 9.19% linolenic acids. A higher intake of poly-unsaturated fatty acid is associated with lower risk of cardiovascular disease. Further alpha-linoleic acid is a precursor of EPA and DHA, both of which are beneficial for cardiovascular and brain health. Bio-availability of iron is reportedly high in edamame. Considering the nutritive value and benefits, the edamame has been considered as 'functional food', and has become a popular snack in Japan and other East-Asian countries and is now attracting attention worldwide.

Agronomic benefits

Being a leguminous crop, soybean cultivation provides not only protein-rich foods but also enriches the soil by fixing atmospheric nitrogen. Thus,

it reduces the amount of nitrogenous fertilizer needed for its cultivation with eventual reduction in the cost of production of the crop. Lesser fertilizer application contributes towards maintaining the soil health. Further, the nitrogen fixed by the soybean roots through symbiotic association with rhizobium bacteria helps the next crop grown in the same field. Vegetable soybean has a short crop span and hence can be fitted well in any cropping sequences. When grown as mixed or inter-crop, soybean supports growth of the companion crop as well. Soybean being a *kharif* crop, it is grown mainly as rain-fed crop and thus saves irrigation water, electricity and money too.

Economic benefit

With the growing awareness about health and nutrition, demand for traditional food such as edamame has been on the rise globally. It is predicted that the increased demand will continue as consumers are tired of junk foods and looking for healthier and cheaper sources of protein to add to their diet. Rapid demand has led to market boom for edamame across the countries. A traditional food of eastern origin now finds a respectable position in the western food menu. In USA, edamame has become the second most consumed soy-food after soymilk. It has predicted that edamame or vegetable soybean would surpass other soy-based products by 2020. To meet this growing demand, the growers, plant breeders, and food processors have shown overwhelming interest in the production of edamame as a commercial commodity. In India too, commercial cultivation and marketing of vegetable soybean has been on the rise, it is sure to rise further with time.

Necessary improvement in edamame

To make edamame a household food in India, improvement in its taste, flavor and texture is the key. Caused by lipoxygenase activity, soybean inherits a characteristic beany-flavor, which is primarily

disapproved by the consumers at large. For wider acceptability and improvement of eating quality of edamame, deactivation of lipoxygenase is critical. On the other hand, as envisaged, vegetable soybean genotypes with pleasant aroma (Basmati-flavored) are getting wider acceptance among the consumers of East Asia, Europe and United States of America and fetching higher prices than the non-aromatic genotypes. Basmati flavored soybeans are also preferred by the consumers in India. Similarly, sweetness and softness of the seeds are other quality characteristics that need attention for their genetic improvement. Cultivars with higher sucrose content are highly popular in Japan. Taste is the result of chemical composition of the soybean seeds. A combination of ascorbic acid, sucrose, glutamic acid and alanine contributes towards taste of vegetable soybean. Bitterness, astringency and off-flavors are the result of saponins, isoflavins. Similarly, Kunitz trypsin inhibitors, an anti-nutritional factor is also present in the seeds. It deserves elimination as it can cause indigestion after consuming raw vegetable soybean in higher quantity. Crop duration and yield are the other important factors that need attention. Varieties should develop pods early and yield of the green seeds should be high. Further, the stage of pod at the harvest is crucial for sweetness of the seeds, because, sucrose content in the seeds is high at the early stage and decreases with increase of age. Vegetable soybean should be harvested when pods are still green, immature, tight and fully developed with immature green seeds. It comes at R6 stage of a variety. Himso1563 and NRC105, two vegetable soybean varieties developed by institutes under the Indian Council of Agricultural Research, New Delhi, produce 5 and 3 tonnes/ha vegetable soybean, respectively. Swarna Vasundhara is another vegetable soybean variety that has been released for commercial cultivation in India. However, genotype that can produce around 10 tonnes/ha would be more profitable. Uniform maturity and



ground clearance (distance from soil surface to the lowermost pod) should be considered for mechanized harvesting and mechanical separation of the pods from the plants. It will reduce the labor cost substantially. Availability of quality seed is critical for expansion of area under vegetable soybean. Poor viability of seeds upon ambient storage in tropical and sub-tropical regions of the world affects crops stands and eventual yield. Resistance of varieties against various insect-pests and diseases as well as weeds would be highly desirable.

SUMMARY

Edamame or vegetable soybean is a highly nutritious food of plant origin. It can be cultivated without much difficulty as sole, inter- or mixed crop. It also enriches the soil by fixing atmospheric nitrogen. It is an effective alternate source of nutritive vegetable that can be harvested within 2 months and can be served round the year as frozen seeds. It can be a rich supplement of protein to the vegetarian people. Inclusion of edamame or vegetable soybean in the mid-day meal and

other community meals can help fight protein-energy malnutrition prevalent in the country. Scientific intervention can eliminate non-nutritious elements from the edamame genotypes and can make it truly a wonderful vegetable and nutritive supplement for all.

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FSSAI commemorates World Food Day by launching several innovative initiatives

New Delhi, 16th October 2019: The country's food regulator commemorated the World Food Day today by launching several innovative initiatives to strengthen food safety administration and scale up the 'Eat right India' movement.

In order to strengthen food safety administration, FSSAI launched the '*Food Safety Mitra (FSMs)*' scheme to support small and medium scale food businesses in compliance to the food safety law by facilitating licensing and registration, hygiene ratings and training. Apart from strengthening food safety, this scheme would also create new employment opportunities for youth, particularly with food and nutrition background. The FSM would undergo training and certification by FSSAI to do their work and get paid by food businesses for their services. The first batch of 15 FSMs were awarded certificates today. Details of the scheme are available at <https://fssai.gov.in/mitra/>

FSSAI also launched a jacket for field staff. This jacket has a smart design to hold tech devices like tablets/smart phone, a QR code and RFID tag for identification and tracking. Apart from providing safety to field staff on duty, this would bring in efficiency, professionalism and transparency in food safety administration and bring in a sense of ownership & visibility of FSOs.

FSSAI has partnered with the Domestic Workers Sector Skill Council (DWSSC) under the Ministry of Skill Development and Entrepreneurship to launch a training course for domestic workers and homemakers across the country. In the first phase, one lakh domestic workers and homemakers will be trained through training partners of DWSSC in association with RWAs. This would be scaled up in due course.

On this occasion, FSSAI also launched a reusable cloth bag ('Eat Right Jhola') to replace plastic bags for grocery shopping with retail chains such as Big Bazaar, More, 24/7 and Reliance Fresh etc. These cloth bags are being provided on rental basis through a private textile rental service company. Proper and regular washing of cloth bags is essential to ensure safety and hygiene, as on repeated use, bags are often contaminated with microorganisms and bacteria.

For scaling up the Eat Right India movement across the country, FSSAI has got endorsement of several celebrities. Two short films on repurposing of used cooking oil into biodiesel and nutrition in the first 1000 days of life featuring Shri Virat Kohli and Ms. Juhi Chawla respectively, were released on the occasion.

FSSAI has recently partnered with NASSCOM Foundation to develop an online platform to connect over 50 NGOs working to prevent food waste in the country. A short film on the same was also released. In addition, FSSAI is publishing two books, namely 'Gandhi and Food' and 'Eat Right Textbook'.

Courtesy: https://fssai.gov.in/upload/press_release/2019

