Development and promotion of soybean food enterprises in India

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ABSTRACT

Soybean Processing and Utilization (SPU)/Centre of Excellent on Soybean Processing and Utilization at the ICAR-CIAE, Bhopal has conducted 193 batches of soy based food Entrepreneurship Development Programmes (EDP) in which 3000 potential entrepreneurs from 28 states of India participated. Around 300 soybean processing enterprises have been established till date across the country for making different soy products such as soy milk, paneer (tofu), flours, snacks, curds, biscuits, *kabab*, chap, *halwa*, etc. The maximum units are located in Punjab followed by Maharashtra and Uttar Pradesh. These entrepreneurs have provided employment to 1500 workers across the country with an estimated total monetary benefit of Rs. 90 crores per annum. It can be inferred that the soy food based training and entrepreneurship development programme organized by the ICAR-CIAE, Bhopal since 1995 has resulted in the establishment of 300 successful enterprises that are significantly contributing to the Nation's economy as well as in combating protein-calorie malnutrition (PCM) that exists in India.

INTRODUCTION

Soybean, a grain legume and the native of South-East Asia (Manchuria and China), is a very rich source of better quality protein, oil and other nutrients at an affordable price to one and all. Soybean is also known as the "Miracle bean" or "Golden grain" of the globe. Soybeans not only promote human and animal health's but it also improves soil health in which it has been grown, through biological nitrogen fixation and its deep root system which helps soil microbes to survive and perform better (**Ali, 2012**). As of now in the 21st century, soybean is cultivated almost throughout the globe and its present global production is about 385.52 million tonnes with an average world productivity of about 2 tonnes/ha. Soybean on an average contains 40% protein, 20% oil and other nutrients (**Mangaraj et al., 2013**). The major soybean producing countries of the world are Brazil, USA, Argentina, China, India and many other South-East Asian, European and South American countries **(www.sopa.org/statistics/world-soybean-production, 2022)**. Foods and feeds produced after an adequate processing of soybean are nutritionally rich, good for health, inexpensive and enhances immunity

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and longevity of humans and fast growth of the livestock's (**Mathangi and Mangaraj, 2021**).

Worldwide, most of the soybeans are used for edible oil, and partly for biodiesel production and the resultant soymeal for livestock feed and some refined/ extracted proteins such as soy protein concentrates and isolates are used by human beings. However, most of the South-East Asian countries use whole soybean, after careful processing in human diet. As of now in the 21st century, people have started using whole soybean in human diet after appropriate processing, because of health benefits that soy foods provide at a low cost compared to livestock proteins (**Ali et al. 2016**).

SOY BASED FOOD PRODUCTS

The soybean processing and utilization centre (SPU), established in April 1985 at the Central Institute of Agricultural Engineering (CIAE), Bhopal by the Indian Council of Agricultural Research (ICAR), New Delhi in collaboration with the United State Agency for International Development (USAID), Washington, USA and at present, the SPU is known as the Centre of Excellence on Soybean Processing and Utilization (CESPU). As of now, the SPU/CESPU has developed processing technology for more than 40 soy based food products suiting to the Indian tastes and plates (**Kumari et al., 2021**). Some of the very common and popular soy based food products are shown in **Fig. 1.**

MACHINERY AND EQUIPMENT

SPU/CESPU at ICAR-CIAE, Bhopal conducts a 6-day Entrepreneurship Development Programme (EDP), comprising lecture and hands on practices, at a regular interval, using tools, machines, equipment, and pilot plants, specially designed and developed for such activities. As of now, SPU/CESPU has developed around 30 such tools, machines, equipment, and pilot plants (**Mangaraj et al., 2021**). Some of these are shown in **Fig. 2.**

AWARENESS/TRAINING AND ENTREPRENEURSHIP DEVELOPMENT

SPU/CESPU, CIAE has created a mass awareness regarding technology of locally produced soy based food products through awareness camps, participation in seminars, organizing exhibitions, nutrition awareness and training to the Self-Help-Groups (SHGs) members to enlighten and skill development to prepare soy foods, so that, its consumption can enhance the nutritional status

Soy based food products	Nutritional Facts and Health Benefits (minerals = mg/100gm)
 Plain soy milk	***Nutritional facts :*** • Protein = 5.0-6.0% • Fibre = 1.0-3.0% ***Health benefits*** • Good for lactose intolerant consumer • Improves lipid profile • Good for bone health
 Tofu (soy paneer)	***Nutritional facts :*** • Protein =12-14 % • Fat = 7.0-9.0% • Ca = 421mg • P = 282mg ***Health benefits*** • Help in body building & weight loss • Lowers cancer risk • Reduce cholesterol level
 Full fat soy flour	***Nutritional facts :*** • Protein = 35-40% • Fat = 18-22% • Fibre = 1.0-3.0%, • Carbohydrate= 16.2-18.6% ***Health benefits*** • Boost immunity • Reduce CVD risk • Prevents obesity and diabetes
 Defatted soy flour	***Nutritional facts :*** • Protein =46-52% • Carbs = 29-32% ***Health benefits*** • Boost immunity • Reduce CVD risk • Prevents obesity and diabetes
 Soy /Amarkhand	***Nutritional facts :*** • Protein = 7.0-9.0 % • Fat = 9.0-11% ***Health benefits*** • Prevents prostate cancer • Manage menopause symptoms • Lowers the risk of heart disease
 Soy-sattu	***Nutritional facts :*** • Protein = 20-35 % • Fat = 5.0-6.0% ***Health benefits*** • Boost metabolism • Help in weight gain & reduction • Relive menopausal symptoms
 Soy nuts (roasted)	***Nutritional facts :*** • Protein = 30-38 % • Fat ≈19 % ***Health benefits*** • Help to reduce the protein malnutrition condition • Improve bone health
 Soy biscuits	***Nutritional facts :*** • Protein = 11-13 % ***Health benefits*** • Reduce protein malnutrition in children • Aid weight loss • Lowers blood pressure

Fig. 1: Some of the very common and popular soy based food products

of the malnourished children and adults.

The training and Entrepreneurship Development Programme (EDP) on soybean processing and utilization was started in the year 1995 at the ICAR-CIAE, Bhopal. The main aim has been to develop the soy based food enterprises to produce high quality protein and other nutrient rich food products at low cost as well as to create livelihood opportunities and employment generation. The EDP module on soy based bakery's and soy snacks was added in the year 2002. The SPU/CESPU at the ICAR-CIAE Bhopal is the only place in India, where EDP on soybean processing and utilization is offered. The participant entrepreneurs are provided the technical guidance and hand holding support as and when required by them during the establishment and operation/training of their enterprises.

Till April, 2022, 193 batches consisting of 3000 participants from 28 states underwent to the EDP and out of which 2650 entrepreneurs participated in soy milk and soy paneer (tofu) production and 350 entrepreneurs in soy based bakery products and soy snacks. The maximum number of trainees were from Madhya Pradesh (750), followed by Maharashtra, Punjab, Uttar Pradesh, Haryana, Rajasthan and Delhi. The impact assessment of the trained entrepreneur and their establishments was carried out, initially through telephone and later on through personal visit of the selected production clusters (MP, Punjab, UP, Delhi, Haryana, UK, Gujrat, Rajasthan, Bihar and West Bengal) across the country. Around 300 soybean processing units are currently operational in 17 states. However, the maximum, 41 units are located in Punjab, followed by Maharashtra (40 units), Uttar Pradesh (21 units), Haryana (21 units), Delhi (15 units) and Madhya Pradesh (14 units).

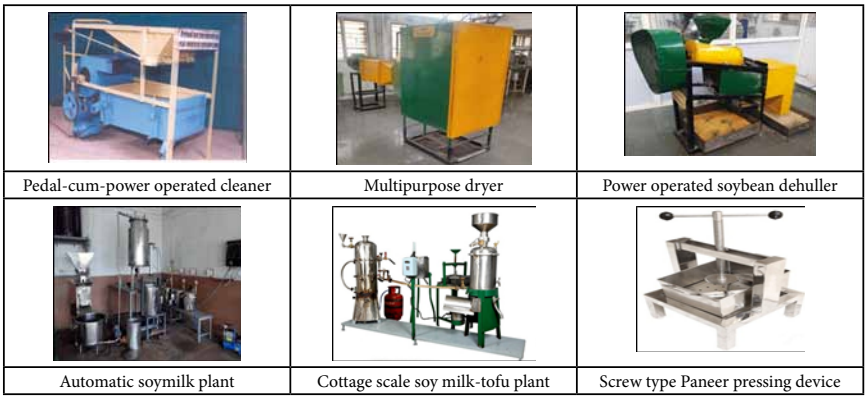

Fig. 2: Some of the machines and equipment developed at SPU/CESPU, CIAE, Bhopal

CONCLUSION

SPU/CESPU has been regularly organizing training on soy milk, soy paneer (tofu) and other bakery products, since 1995 at ICAR-CIAE, Bhopal. After undergoing training the enterprises are establishing soy processing unit at different places across the country and presently 300 soy based processing units are running successfully. Now a day's soy based food products such as soy milk, soy paneer (tofu), flours, snacks, nuts, srikhand, amarkhand, curds, biscuits, *kabab*, chap, *halwa*, etc., are being commercially available in market. These products have substantial potential as protein rich food to address the protein-calorie malnutrition problem especially in developing nations and prevention of diseases. Also, soy based protein has been considered as one of the best source of immunity boosting food, enhancing the utility in the present active corona virus situation in the country.

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