

Soybean: A Golden Crop for Farmers and Markets

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Soybean is a legume which is a nutritionally, and economically important crop considered one of the major sources of oil. The scientific name for soybean, *Glycine max* (L), is derived from Eastern Asia, most likely from north and central China. They are members of the Leguminosae family, subfamily Papilionoidae. It is thought that about 2000 years ago, cultivated cultivars were brought to Korea and then Japan. China and other East and South East Asian nations have been cultivating soybean for thousands of years as a food crop, and these days, soybean play a significant role in the customary popular cuisine of these nations (Ajaykumar,2022). Rich in proteins, vitamins, minerals, fiber and low in saturated fats, soybean are a great food choice. This numerous physiologically active substances' presence made usage of soybean in the pharmaceutical sector to create medications and other food items. Soybean are grown for their oil and protein. Soybeans are the world's greatest source of edible oil, contributing around 50 per cent of global oilseed production despite having a very low oil content (about 20% on a moisture-free basis) (Anonymous, 2023a).

Table 1: Nutritional value of Soybean

Sl. No.	Nutritional Components	Amount
1	Water	8.54 g
2	Protein	36.5 g
3	Total Lipid (fat)	19.9 g
4	Carbohydrate	30.2 g
5	Fibre	9.3 g
6	Sugar	7.33 g
7	Calcium	277 mg
8	Iron	15.7 mg
9	Magnesium	280 mg
10	Phosphorus	704 mg
11	Potassium	1800 mg
12	Sodium	2 mg
13	Vitamin C	6 mg

Source: (Rajeev, 2023)

In India, the potential of soybean as a food source is still mostly unrealized, hence there is a need to find better ways to include it in the diet. Indian palates might be more satiated by blending it with other cuisines. Considering its high-quality protein content, including soybeans in the Indian population's daily diet is essential to fighting the country's pervasive energy-protein malnutrition.

Soybean has many nutrient constituents present in soybean may have the following properties:

- Potential anti-diabetic properties
- Antioxidant effects
- Anti-cancer potential
- Anti-inflammatory properties
- Cardio-protective effects
- Antimicrobial properties
- Anti-obesity potential
- Cholesterol-lowering abilities
- Hepatoprotective properties
- Potential anti-HIV activity

Source: (Rajeev, 2023)

World and Indian Scenario in production of Soybean

Brazil emerged as the largest producer, accounting for 38.7 per cent of the world production, followed by the United States at 31 per cent, Argentina at 13.50 per cent, China at 5 per cent and India at 3 per cent, (Anon., 2022a). India, ranking fourth in soybean cultivation area and fifth in production, significantly influences the global soybean landscape. The major soybean-growing states are Madhya Pradesh, Maharashtra, Rajasthan, Karnataka, Andhra Pradesh, and Chhattisgarh (Anonymous.,2023b).

Conditions required to cultivate soybean

Almost all soil types are suitable for soybean growth, with the exception of deep sands that have

little water retention. Because the ideal pH range for soil is 6.0 to 6.5, liming can be necessary. In terms of climate, temperate zones are ideal for soybean growth. Since the soybean is a "short-day" plant, flowering happens when the evenings get longer. A 500–700 mm rainfall range is necessary for excellent crops. A sufficient supply of water is particularly necessary during the stage of pod and seed development, also known as the pod filling stage (Anonymous, 2023a).

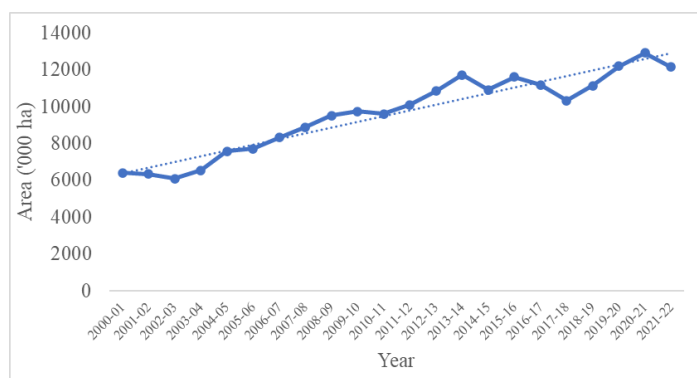


Fig. 1: Trends in area of soybean in India from 2000-2023

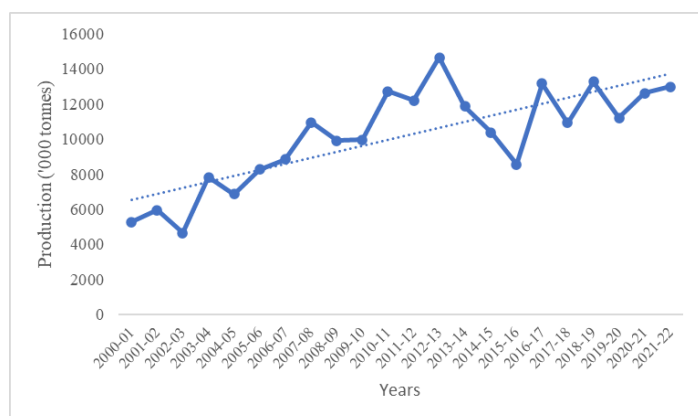


Fig. 2: Trends in production of soybean in India from 2000-2023

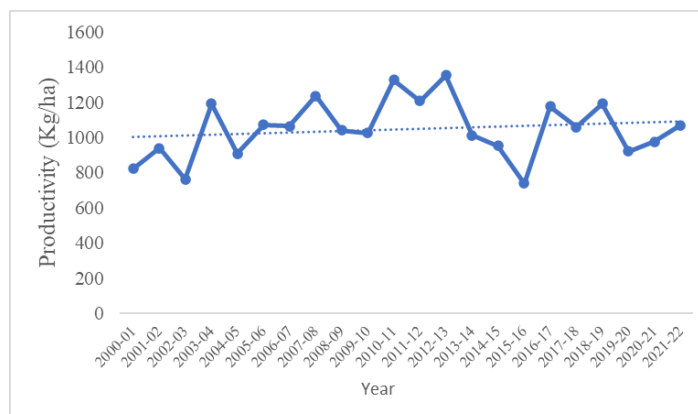


Fig. 3: Trends in productivity of soybean in India from 2000-2023

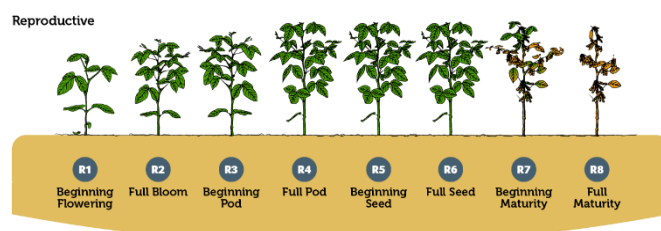


Fig. 4: Depiction of Soybean growth stages

The ability of the soybean plant to fix nitrogen through symbiosis with modulating bacteria *Rhizobium* in the soil is a crucial feature. According to estimates, the nitrogen-fixing system may provide up to 50% of the plant's total nitrogen needs (Anonymous, 2023a). Soybean are crucial to the process of carbon sequestration because they actively collect atmospheric carbon dioxide (CO₂) and store it in plant biomass and soil organic matter. Soybean roots contribute to soil conservation by enhancing soil structure, aeration, and water penetration through their deeply embedded root system and distinct growth characteristics (Karunakaran and Behera, 2015).

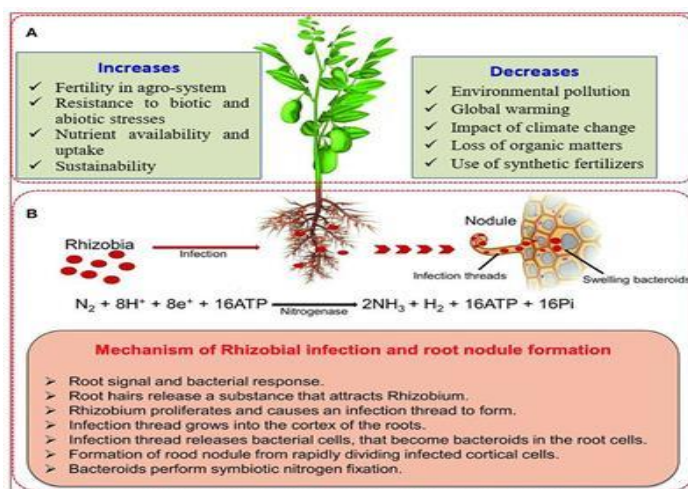


Fig. 5: Nitrogen Fixation in soybean

Varieties of soybean

Most Indian cultivars were developed from exotic parents. Based on their breeding history, the Indian varieties can be separated into two groups. Among the first group are the Bragg, Lee, Better Pelican, Hardee, Monetta, Shilajeet, Co 1, Gujarat Soy 1, Gujarat Soy 2, VL Soy 2, and JS 71-05 varieties (Anonymous, 2022c). Direct selection of both native and foreign material has led to the evolution of these cultivars. The second group contains the majority of Indian variations, which resulted from hybridization

and mutation within or among the varieties of the first group. To promote soybean-based secondary agriculture, the Directorate of Soybean Research, Indore, has taken up a number of novel initiatives and has come out with a good number of technologies (Anonymous, 2022c).

Table 2: Different soybean Varieties grown in major soybean cultivating states in India

Sl. No.	State	Varieties
1	Madhya Pradesh	Ahilya series, Prabhani sona, Shakti <i>etc.</i>
2	Maharashtra	MACS series, Phule Kalyani, JS-335 <i>etc.</i>
3	Rajasthan	Pratistha, Shakti, Pratap soya <i>etc.</i>
4	Karnataka	Sneh (KB 79), KHSb series, DSB series, JS-335 <i>etc.</i>
5	Andhra Pradesh	Pant Soybean 1029, MACS series, Monetta and Bragg <i>etc.</i>
6	Chhatisgarh	Ahilya series, Pratap soya <i>etc.</i>

(Source : Anonymous, 2022c)

Production and Marketing of Soybean

The farmers make the necessary investments like seeds, chemical fertilizers, plant protection chemicals, weedicide, insurance *etc.*, and the returns on the investment are good in soybean production due to the increasing demand. Introduction of soybean has helped in improving the socioeconomic conditions of a large number of small and marginal farmers probably because even under minimum agricultural inputs, management practices and climatic adversities, it fetches profitable returns to the farmers. Soybean is one of the most resilient crops for the rainfed kharif season as despite aberrant weather conditions in the recent past, the crop has maintained its performance.

The lesser the number of intermediaries the higher the share of producers in the consumer's rupee. The produce is sold to processors from farmers *via* different marketing channels as per the prices prevailing in the market and processed into various value-added products. The main product with high demand is soy oil and other products that can be formed using soybean are soy flour, tofu, soy meals, soy biscuits, soy sauce, soy chunks, poultry feed *etc.*

These diversified products can be made using soybean. Due to the increasing demand, the Products provides a market opportunity to all the stakeholders involved in marketing of soybean.

Table 3: Inputs required to grow soybean

Sl. No.	Inputs	Quantity / acre
1	Seeds	25 kg
2	Farm yard manure	2.4 t
3	N: P: K	16 : 31: 10 kg
4	Zinc Sulphate	5 kg
5	Spacing	30 *10 cm
6	Yield	10-14 q

Note: N:P:K- Nitrogen: Phosphorous: Potassium, kg- Kilograms, cm- centimetres, t- tonnes, q- quintals

Source : (Anonymous, 2020).

Table 4: Marketing Soybean *via* different channels

Sl. No.	Channels	Producers share in consumers rupee	Marketing efficiency
1	Producer - Processor	94.65	17.71
2	Producer - Trader cum commission agent - Processor	85.87	5.93
3	Producer - Wholesaler - Processor	83.94	5.23

Source: (Shilpa, 2024)

However, sometimes farmers face production difficulties like labour scarcity, unawareness of improved varieties released, pest and disease attacks and marketing difficulties like delayed payments, inadequate market information and storage problems. These problems can be solved by extension services where farmers are made aware of improved and newly released varieties, get a better awareness of recommended agricultural practices and Good Agricultural Practices, development of custom hiring centers, training programs for farmers *etc.* (Shilpa, 2024).

Initiatives by govt. to encourage soybean cultivation

To give farmers price stability and a just return on their investment, through government schemes like National Food Security mission to promote oilseeds and minimum support prices (MSPs) to impose

regulations to support soybean prices, Integrated Scheme on Oilseeds, Pulses, Oil Palm and Maize (Anonymous, 2023b)

Conclusion

In the future, soybean may become extremely important because of the fast-rising per capita use of vegetable oil brought on by population growth and increased economic standing. Owing to developments in the field of lipid biochemistry and the ability to improve the yield and quality of edible oil produced from soybeans, this crop has the potential to become a major global producer of oil. Soybean-based cuisine is a less expensive and typically healthier source of high-quality protein. The crop has the ability to end protein deficiency, which is a problem in the nation's impoverished communities.

Farmers may fully realize the promise of soybean as a flexible and profitable Hence, Soybean is like a treasure for farmers. It helps them save money on fertilizers and protects the environment by storing carbon dioxide. Plus, it gives good returns on investment and can cope up with different weather conditions, making it a reliable choice and utilizing clever marketing strategies for to improve their incomes and resilience in farming. The export of soy meal is generating foreign exchange, which is driving out the nation's supply of high-quality protein that the underprivileged segments of society require at a reasonable cost. To increase the nation's use of soybean as a staple meal, both public and private sector activities should take a proactive approach. Farmers can secure long-term prosperity for themselves and their communities by meeting the demands of a constantly changing market and securing a prominent position within the agricultural industry.

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