SOPA-7th International Soy Conclave

SOYBEAN FROM OIL TO PROTEIN

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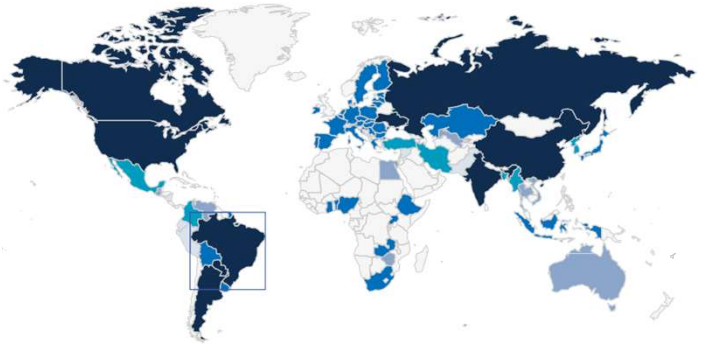
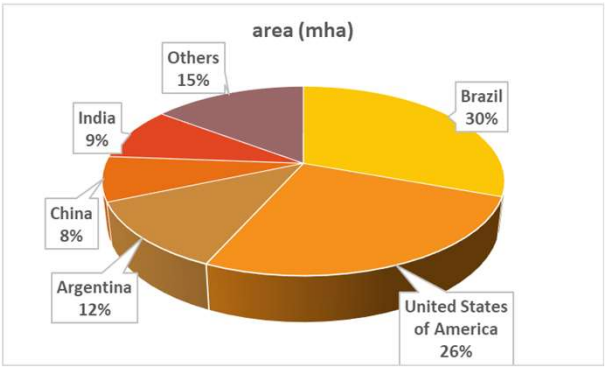
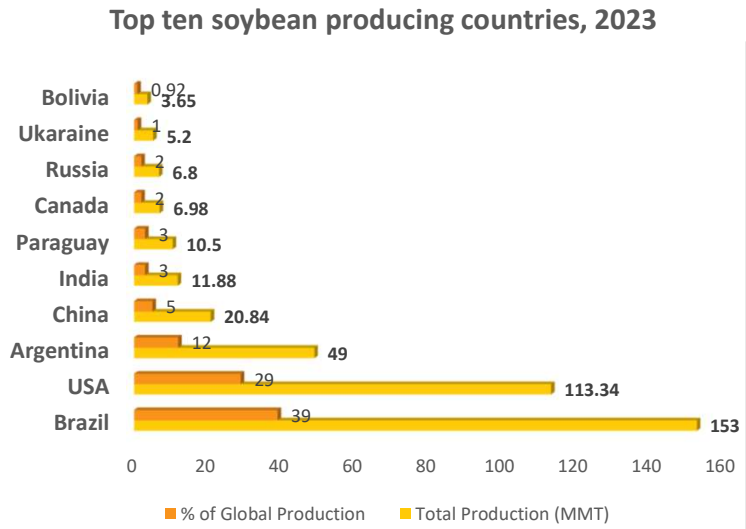
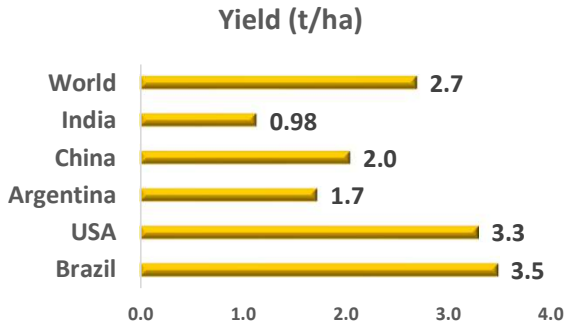
Soybean in World (2023)



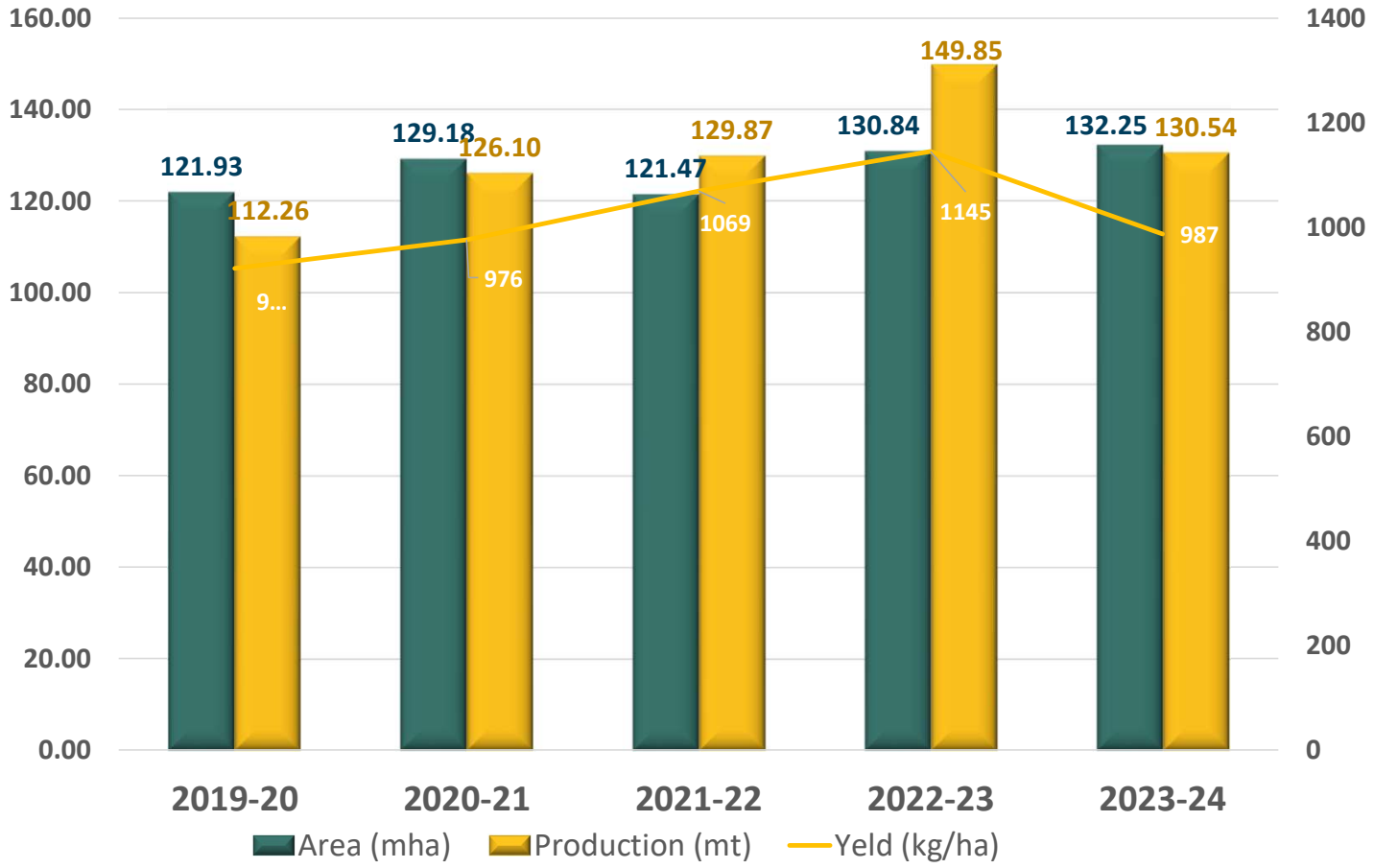






- **113 countries Produced 395.12 mt Soybean in 2023-24. (USDA)**
- **5 Countries Produced 89% of world's total soybean**
- **India ranked fifth in total production**
- **Meager average yield in India (80th in global rank)**

Area, Production and Yield of soybean in India



Source: DE&S, New Delhi

Soybean Importance

- Soybean is the most traded and processed crop commodity, predominantly used as soymeal typically as source of high protein for animal feed and as edible oil.
- Its best benefits can be harnessed by value addition for human health and nutrition.

- The global soybean sector is projected to grow from its current value of USD 155 billion to USD 278 billion by 2031
- Total Soy product export was USD 1232 Million in 2023-24
- Almost 8 % of the total exchequer (USD 14,960.54 Million) on edible oil import and 37% of the total soybean import (USD 3301.8 Million) was offset by the export of soy products (including oil and seed meal) during 2023-24.

Soybean Health benefits-protein digestibility

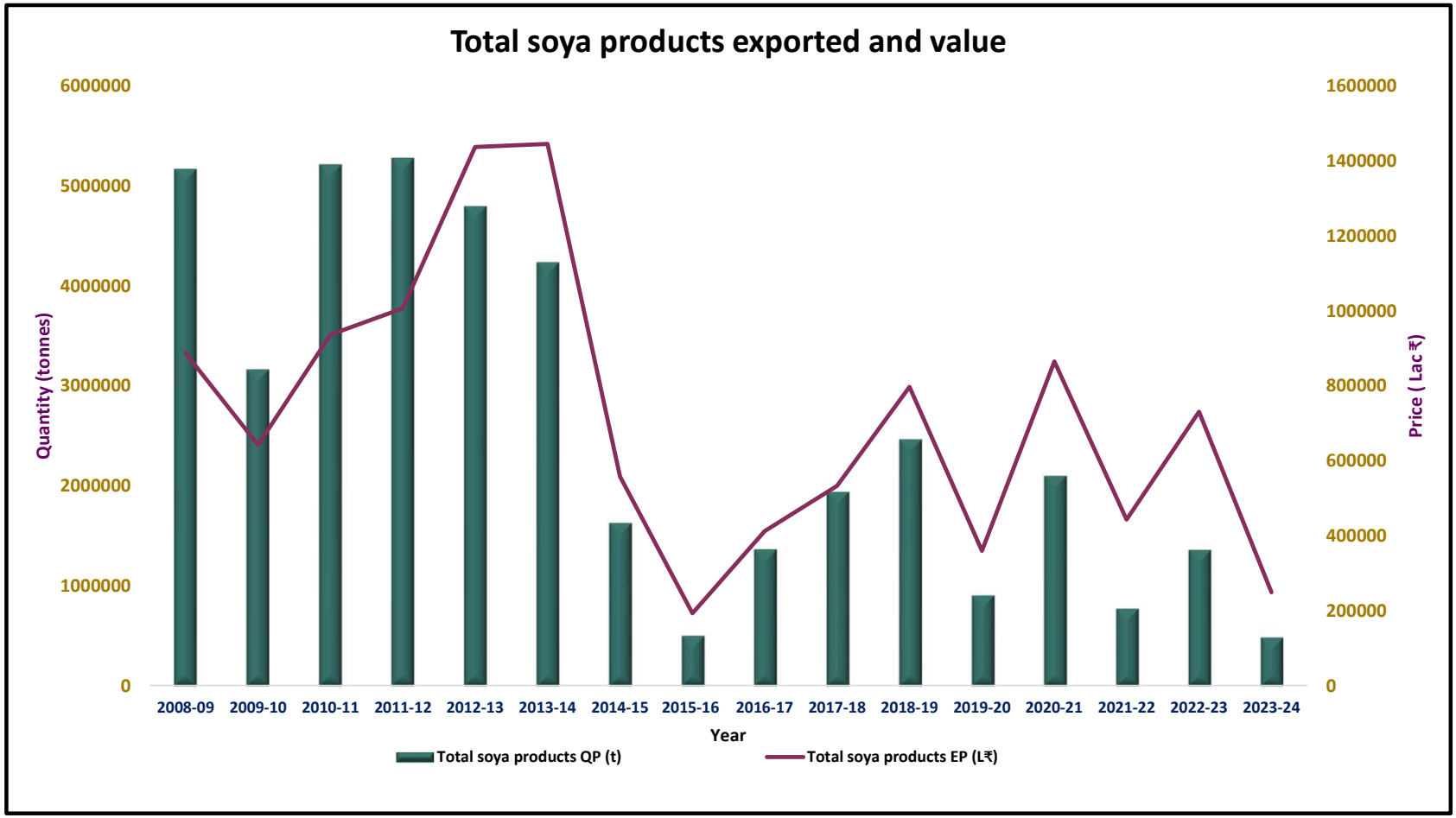
(Kim et al., 2021)

Influence of food processing on the soybean protein digestibility.

Food processing	Protein evaluation method	Results
Cooking (100°C, 30min)	IVPD (%)	89.8
Autoclaving (123°C, 20min)	IVPD (%)	81.3
Fermentation	IVPD (%)	90
(Bacillus Natto, 25°C, 48h)		
Unfermented	IVPD (%)	83
Protein isolate	IVPD (%)	93
	PDCAAS	100
Protein concentrate	IVPD (%)	100

IVPD, In vitro protein digestibility. Adapted from Sá, Moreno, and Carciofi. (2020).

Total soya products exported and value in last two decade



Indian Soybean Product Exports (2023-24)

Soybean Product	India's Total Export (2023-24) (USD Million)	Percentage Growth (YOY)	Compound Annual Growth Rate (Over 5 years)
Soybean beans,whether or not broken	4.98	-86.38	-46.62
Soya bean flour and meals	10.11	2.29	-9.10
Soy sauce	1.65	13.13	15.58
Protein concentrates and textured protein substances	51.20	24.10	12.48
Soya milk drinks, whether or not sweetened or flavoured	0.08	229.11	2.71
Soya bean oil and its fractions,whether or notrefined, but not chemically modified	20.85	-29.96	17.20
Oilcake of soya- bean oil	1036.50	21.54	-1.34
Lecithins and other phosphoaminolipd	162.55	-33.47	16.75
Isolated Soy protein	2.27	-23.02	44.53

World Average Unit Values and India's Unit Values for Various Soybean Products

Soybean Product	World Average Unit Value (USD/Ton)	India's Unit Value (USD/Ton)	Major Importer of India
Soybean beans, whether or not broken	534	810	Canada, Nepal, Sri Lanka, Belgium, Vietnam
Soya bean flour and meals	571	887	Korea, Sri Lanka, Nepal, USA, Soudi Arabia
Soy sauce	1544	1433	USA, UAE, Nigeria, Nepal, Bhutan
Protein concentrates and textured protein substances	4358	1295	Soudi Arabia, UAE, Korea, Philippines, Turkey
Soya milk drinks, whether or not sweetened or flavored	1263	1870	UAE, Nepal, USA, UK, Bhutan
Soya bean oil and its fractions, whether or not refined, but not chemically modified	1115	1629	Bhutan, Australia, UAE, Hong Kong, Onam
Oilcake of soya- bean oil	521	587	Bangladesh, Vietnam, Nepal, Iran, UAE
Lecithins and other phosphoaminolipd	2717	4604	Netherlands, Italy, USA, Spain, Turkey
Isolated Soy protein	17717	5489	USA, Korea, UK, UAE, Spain

Global Market for Soy Protein

The soy protein market was valued at USD 8.75 billion in 2022, projected to reach USD 12.5 billion by 2027 at a CAGR of 7.3% (Markets and Markets, 2023).

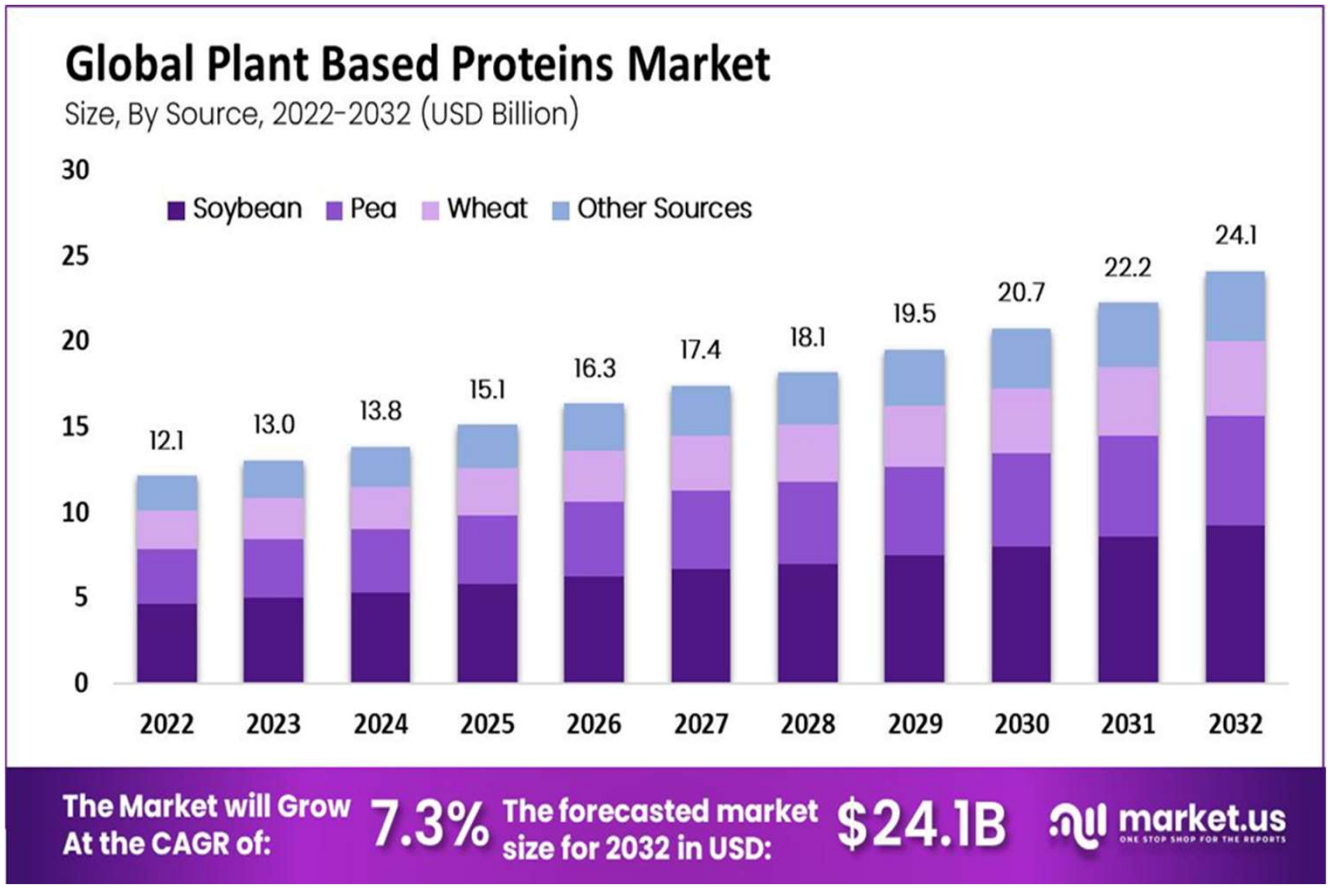
Soybean's Contribution to the Indian Economy:

- Soybean contributes over INR 400 billion to India's agriculture sector, with Madhya Pradesh and Maharashtra as the leading states.
- India's annual soybean production is 12-13 million metric tons, which is used in the production of oil, seed meal, and other food products.

Opportunities in Value-Added Products:

- With global demand for plant-based proteins on the rise, soy protein products like protein concentrates, isolates, and textured soy protein (TSP) offer tremendous export potential.
- India's soy protein exports reached USD 1.2 billion in 2022, expected to grow with value-added processing facilities (APEDA, 2023).

Soybean protein Potential in future



Opportunities for Establishment of Soybean Protein Extraction Processing Machinery

Opportunities for Machine Manufacturers:

- India's demand for soy protein extraction and processing machinery is expected to grow by 12% annually due to the rise in soy protein product development.
- Entrepreneurs and machine manufacturers should focus on developing cost-effective, energy-efficient machinery for protein concentration, extrusion, and packaging.

Environmental Benefits and Sustainability

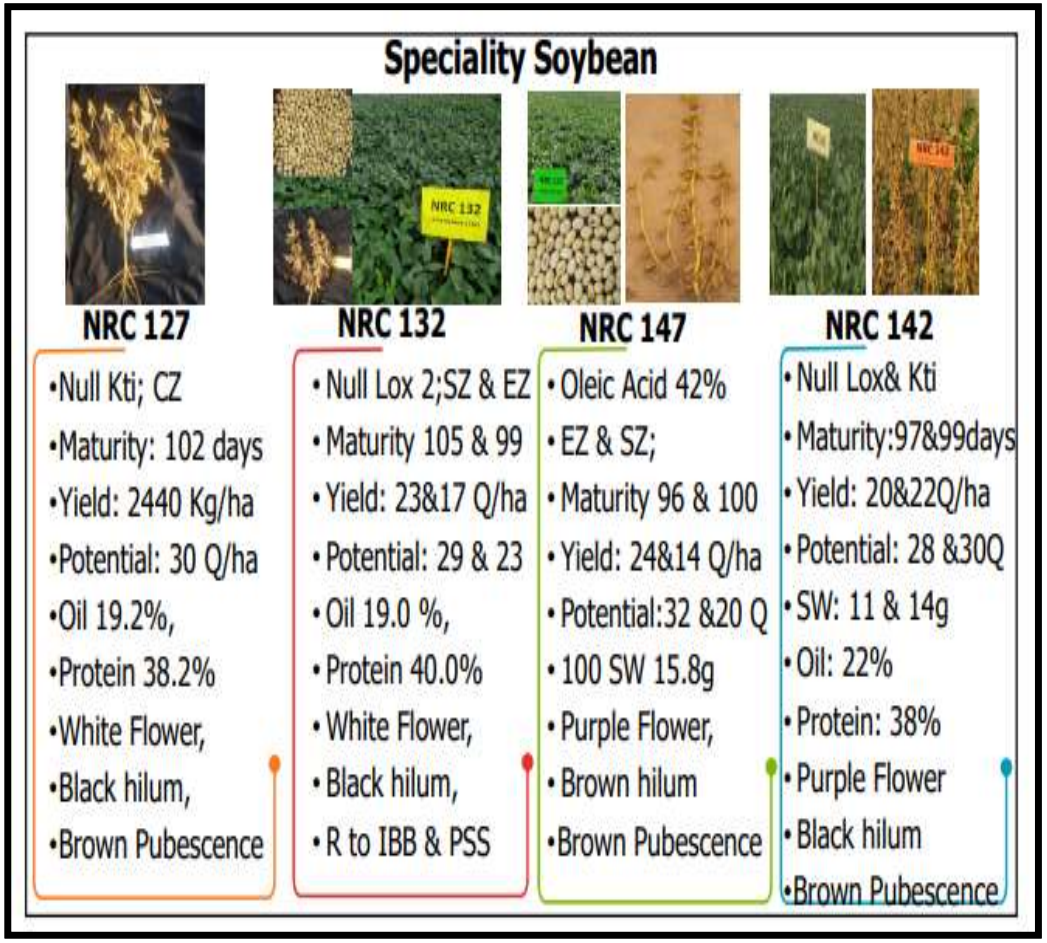
Lower Carbon Footprint of Soy Protein:

- Producing 1kg of soy protein generates 4.5 kg CO2 equivalent, significantly lower than beef protein production, which generates 27 kg CO2 equivalent (Global Environmental Impact Report, 2022).
- Water usage: Producing 1kg of soy protein requires 1,500 liters of water, while beef requires 15,000 liters for the same amount of protein.

Boosting Farmer Income through Value-Addition

- Farmers can earn 15-20% more by participating in local soy processing operations for soy flour, textured soy protein (TSP), and soy milk.
- Soy processing units can be set up through farmer cooperatives, with capital assistance from the government's Agriculture Infrastructure Fund, which provides up to 3% interest subsidies and loan guarantees (PM-Kisan Yojana, 2023).

Achievements of IISR Indore : Food Grade Soybean



NRC 150

- Lipoxygenase 2 free
- Early maturing

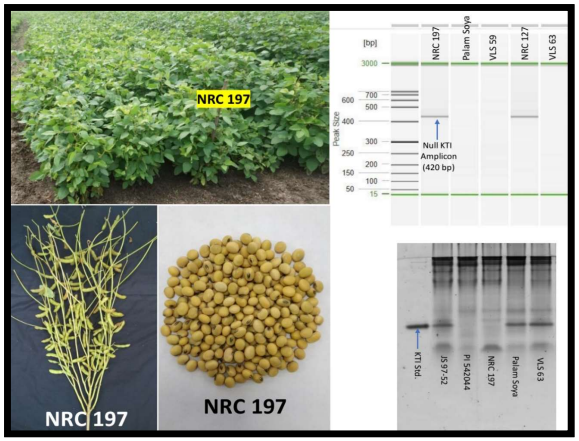
NRC 152

- KTI free
- Lipoxygenase 2 free

Achievements of IISR Indore : Food Grade Soybean

NRC 181 (Food grade: KTI free)

NRC 188 (Vegetable type)



NRC 197 :Kunitz trypsin inhibitor (KTI) free early maturing variety for North Hill zone.

NRC 149 : KTI free North Plane Zone

SOY PRODUCTS TECHNOLOGIES
Available at ICAR-IISR, Indore for commercialization

Food products for commercialization

TOFU

SOY MATHRI

Soy SEV

Soy Halwa

SOY NUTS

SOY DAHI

SOY MILK

SOY COOKIES

Technologies commercialized (specialty soybean line/ variety) by ITMU-IISR, Indore

S. No.	Name of firm	Name of specialty soybean line/ variety	Year
1.	Suminter India Organics Pvt. Ltd., Andheri (w), Mumbai- 400053	NRC 181(Kunitz trypsin inhibitor free), high protein	2022
2.	Nature Bio Foods Limited, New Delhi	NRC 109 (Lipoxygenase -2 free soybean line)	2017
3.	Sonic Biochem Extraction Limited, Indore	NRC 109 (Lipoxygenase-2 free soybean line)	2016
4.	Ruchi Hi-Rich Seeds Private Limited (RHSPL) Mumbai	NRC 101 (Kunitz trypsin inhibitor free), high protein	2014
5.	ITC Limited, Secunderabad	NRC 102 (KTI-free) & IC 210 (high oleic acid)	2014

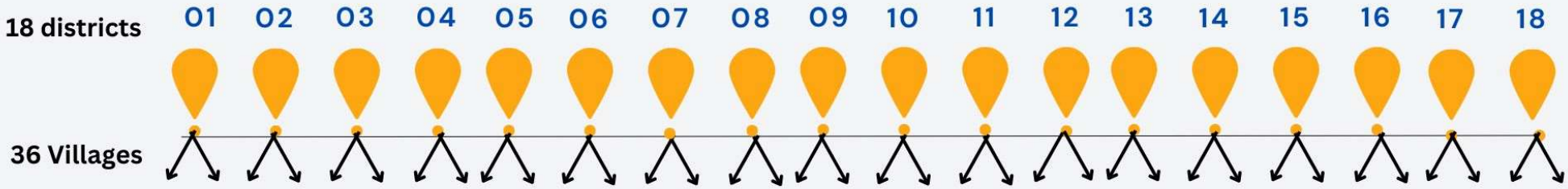
Handholding agri start-ups for production of biofertilizers, Soyfood processing and seed business sectors

Glimpses of Industry Meet (23rd Feb 2024)

DEMONSTRATION OF EARLY AND MEDIUM DURATION SOYBEAN CULTIVARS UNDER SOYBEAN-WHEAT CROPPING SYSTEM IN MADHYA PRADESH

STUDY AREA: 18 DISTRICTS OF MADHYA PRADESH (180 DEMONSTRATIONS)

Indore, Ujjain, Dewas, Shajapur, Dhar, Sehore, Rajgarh, Bhopal, Jhabua, Mandsaur, Khandwa, Khargone, Alirajpur, Burhanpur, Neemach, Ratlam, Agar and Barwani



Selection of Districts: districts having significant area under soybean-wheat cropping system.

Selection of vilages/farmers : 2 villages from each district and 5 farmers from each village will be selected for demonstrations.

Nodal Officer: DDA from each district

Promotion of Soybean using Social Media Platforms

Role of Industries for Soybean Development

- Industry and ICAR IISR linkage for research and development programs-CSR Fund
- Establishment of Industry and market support in non traditional areas
- Premium price policy for food grade soybean
- Trade marking for soy foods

Thank You