Varieties/Hybrids for Commercialization

ICAR- Indian Institute of Oilseeds Research

TilhanTec-SUNH-1 and SUNH-2 Sunflower Hybrids with Potential for Commercialization

Sunflower hybrid: TilhanTech-SUNH-1

Maturity	**90-100 days**
Seed yield	**2000 kg/ha (RF) 2600 kg/ha (IR)**
Oil content	**37-41%**
Recommended areas	**Maharashtra, Karnataka, Telangana, AP, Tamil Nadu, Gujarat, Uttarakhand, J&K**
Special features	**Resistant to Downy mildew; moderately resistant to leafhopper**
Year of release	**2021**

Contact: Dr. H.P. Meena (meena.hp@icar.gov.in)

TilhanTec-SUNH-2 (IIOSH-460)

Maturity	**Early Duration (84-87 days)**
Average seed yield (kg/ha)	**1600 kg/ha (RF) 2500 kg/ha (IR)**
Oil content	**38-40%**
Recommended areas (States)	**Gujarat, Maharashtra and Northern Karnataka, Andhra Pradesh, Southern Karnataka, Tamil Nadu and Telangana State**
Special features	**Downy mildew and moderately resistant to leafhopper**
Year of release	**2023**

Contact: Dr. H.P. Meena (meena.hp@icar.gov.in)

Technology assessment

Considerations	Projections
Potential of the technology	Increased seed yield beyond 2000 kg/ha from the current 1400-1500 kg/ha
Target areas	Gujarat, Maharashtra, Karnataka, Andhra Pradesh, Tamil Nadu and Telangana State
Potential buyers of technology	Seed companies, Public agencies, Farmer producer organizations, State Seed Corporations (SSC), NGOs, Startups
Competitors of similar technology	KBSH-44, LSFH-171, DRSH-1, RSFH-1887, COH-3, private company hybrids
Estimated market for technology	TilhanTech-SUNH-1&2: 50,000 ha (2,50,000 kg seed/5 kg seed per ha) Selling price: 550-650/kg
Cost of production	Rs. 250-300/kg
Uniqueness	Higher seed and oil yield, resistant to DM and moderately resistant to LH
Anticipated social impact	Additional income of Rs 6400 to 9200/ha with an yield advantage of 1 to 1.5 q/ha

Other hybrids released during the last 6 years

Name	Year of release	Potential yield (kg/ha)	Specific features	Recommended area/states
KBSH-78	2018	1700-2000	Early (82-85)	Karnataka
CoH-3	2018	2200-2400	High oil (42%)	Tamil Nadu
PSH-2080	2019	2441	High oil (43.7%)	Punjab
RSFH-700	2021	1800-2200	Tolerant to SND & ALB	Karnataka
KBSH-85	2021	1800-2200	Resistant to DM & LH	Uttarakhand, J&K, Gujarat, Karnataka, Maharashtra, AP, Tamil Nadu and Telangana
KBSH-88	2023	1500-2100		
CoH-4	2023	2182	Moderately resistant to PM & ALB	Tamil Nadu
KBSH-90	Pipeline	1600-2000	Early (80-82) Resistant to DM & LH	Karnataka

DM=Downy mildew; LH=Leafhopper; SND=Sunflower Necrosis Disease; ALB=Alternaria Leaf Blight

Photos of recently released Sunflower hybrids


KBSH-78

KBSH-85

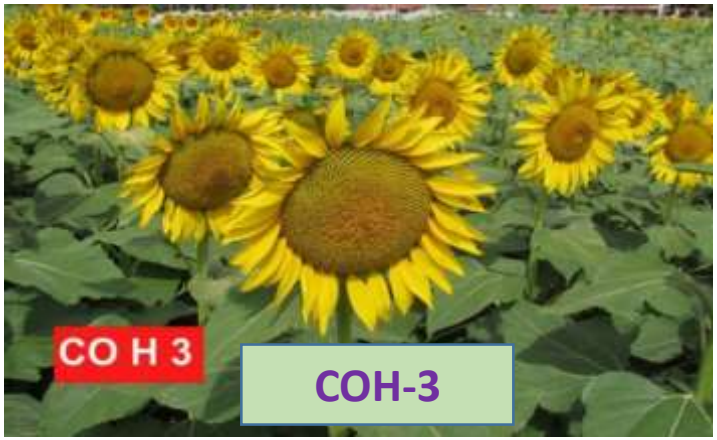

KBSH-88


KBSH-90


RSFH-700


PSH-2080


COH-4



COH-3

ICAR- Indian Institute of Oilseeds Research

IIOR safflower varieties/hybrids with Potential for Commercialization

Safflower variety: ISF-764 (Lakshmipriya)

Maturity	**125-130 days**
Seed yield	**1583 kg/ha (RF) 2274 kg/ha (IR)**
Oil content	**30.6%**
Recommended areas	**Maharashtra, Karnataka, Telangana, AP, MP, Chhattisgarh, Bihar, Uttar Pradesh, Rajasthan**
Special features	**Moderately resistant to wilt & Alternaria**
Year of release	**2020**

Contact: Dr. H.D. Pushpa (Pushpa.HD@icar.gov.in)

Safflower variety: ISF-1 (Pride)

Maturity	**125-130 days**
Seed yield	**1236 kg/ha (RF) 1864 kg/ha (IR)**
Oil content	**30.5%**
Recommended areas	**Maharashtra, Karnataka, Telangana, AP, MP, Chhattisgarh, Bihar, Uttar Pradesh, Rajasthan**
Special features	**First high oleic (76%) variety**
Year of release	**2020**

Contact: Dr. H.D. Pushpa (Pushpa.HD@icar.gov.in)

Safflower hybrid: ISH-402

Maturity	**120-125**
Seed yield (kg/ha)	**2003 (Rainfed) 3008 (Irrigated)**
Oil content	**30.8%**
Recommended areas	**Maharashtra, Karnataka, Telangana, Andhra Pradesh, Madhya Pradesh and Chhattisgarh**
Special features	**CGMS based hybrid with high seed and oil yield**
Year of release	**2023**

Contact: Dr. H.D. Pushpa (Pushpa.HD@icar.gov.in)

Safflower hybrid: ISF- 300

Maturity	**125-129 DAYS**
Seed yield	**1796 kg/ha**
Oil content	**38.2%, 694 kg/ha oil yield**
Special features	**Resistant to wilt, High oil content with moderately thin hull and seed weight**
Recommended areas	**Maharashtra, Karnataka, AP, Telangana, MP and Chhattisgarh**
Year of release	**2023**

Contact: Dr. H.D. Pushpa (Pushpa.HD@icar.gov.in)

Technology assessment

Considerations	Projections
Potential of the technology	Increased seed yield beyond 2000 kg/ha from the current 1400-1500 kg/ha
Target areas	Maharashtra, Karnataka, Telangana, AP, MP, Chhattisgarh, Bihar, Uttar Pradesh, Rajasthan
Potential buyers of technology	Seed companies, Public agencies, FPOs, SSCs, NGOs, Startups
Estimated market for technology	75,000 ha (7,50,000 kg seed@10 kg seed/ha) Selling price: 100 -120/ kg
Cost of production	Rs. 60-65/kg
Uniqueness	Higher seed and oil yield, resistant to Fusarium wilt and drought.
Anticipated social impact	Additional income of Rs. 10000 to 15000/ha with an yield advantage of 2 to 3 q/ha

Varieties released during the last 5 years

Name	Year or release	Yield (Kg/ha)	Oil (%)	Days to maturity	Special traits	Recommended area
ISF-1	2020	1200 (RF) 1800 (IR)	31	125-130	HIGH OLEIC (76%)	All India
ISF-764	2019	1500 (RF) 2200 (IR)	31	125-130	MR to W & ALS	All India
ISH-402	2023	2300 (IR)	31	120-125	CGMS based hybrid	All India
ISF-300	2023	1800	38.2	125-130	High oil, RW	MH, K, AP, TS
A-2020	2021	1740 (RF) 2160 (IR)	28.6	120-125 (RF) 140-145 (IR)	-	MH, K, AP, TS
DSAF-1	2021	1740 (RF) 2160 (IR)	28.2	125-130	MRW	MH, K, AP, TS
IGKV-Kusum	2021	2710 (IR)	34.3	138-140	HIGH oil, R to W	Chattisgarh MP
RVSAF-18-1	2023	1746	39	127-130	HIGH Oil, MRW	K, MH, TS, AP, J, Ch

R- Resistant, MR- mod. Resistant
W-Wilt, A- aphid, ALS-Alternaria leaf spot

IR-Irrigated, RF-Rainfed

Varieties released during the last 5 years

Name	Year or release	Yield (Kg/ha)	Oil (%)	Days to maturity	Special traits	Rec. area
PBNS-184	2022	1750 (RF)	31.3	120-124	MR to A, W, ALS	MH, K, AP,TS
PHULE-NIRA	2020	1480 (RF) 2050 (IR)	32.9	120-124	MR to A	All India
PHULE-BIVARA	2020	1620 (RF) 2600 (IR)	29.5	125-130	MR to A, W, ALS	MH, K, AP, TS
PHULE – GOLD	2020	1620 (RF) 2600 (IR)	34.6	122	MR to W	MH, K, AP, TS
PHULE-KIRAN	2021	1180 (RF) 1850(IR)	30.5	132	MR to A	MH, K, AP, TS, MP
CG-KUSUM1	2021	1680 (RF)	32-33	122-125	MR to ALS	Chattisgarh
CG-KUSUM 2	2021	2000	35	135	Red flowers	Chattisgarh

R- Resistant, MR- mod. Resistant
W-Wilt, A- aphid, ALS-Alternaria leaf spot

IR-Irrigated, RF-Rainfed

ICAR- Indian Institute of Oilseeds Research

IIOR sesame variety with Potential for Commercialization

Sesame variety: TilhanTec Til-1

Maturity	90 days
Seed yield	950 kg/ha
Oil content	45%
Recommended areas	Karnataka, Maharashtra, Telangana, Odisha, West Bengal, Tamil Nadu
Special features	Moderately resistant to root and stem rot, leaf spots, leaf webber and capsule borer, leaf hopper
Year of release	2023

Contact: Dr. K.T. Ramya (ramya.kt@icar.gov.in)

ICAR-IIOR Castor hybrids and female line for commercialization

Castor hybrid: TilhanTech-ICH-5

Maturity	97-108 days for primary spike
Seed yield	1670 kg/ha
Oil content	46-48%
Recommended areas	AP, Telangana, Karnataka, Tamil Nadu, Odisha Maharashtra
Special features	Resistant to wilt and moderately resistant to root rot and leafhopper
Year of release	2021

Contact: Dr. T. Manjunatha t.manjunatha@icar.gov.in

Castor hybrid: TilhanTech-ICH-6

Maturity	90-100 days for primary spike
Seed yield	1100 kg/ha (RF) (120 days duration) 1900 kg/ha (IR) (150 days duration)
Oil content	46-47%
Recommended areas	All castor growing areas of India
Special features	Resistant to wilt, tolerant to sucking pests due to double bloom
Year of release	2023

Contact: Dr. C. Lavanya (c.lavanya@icar.gov.in)

Castor hybrid: TilhanTech-ICH-66

Maturity	94-97 days for primary spike
Seed yield	1550 kg/ha (RF)
Oil content	48-49%
Recommended areas	Rainfed areas – peninsular India
Special features	Resistant to wilt, root rot and leafhopper
Year of release	2019

Contact: Dr. T. Manjunatha (t.manjunatha@icar.gov.in)

Considerations	Projections
Potential of technology	Increase in seed yield beyond 1550-1670 kg/ha from the current 700 -1400 kg/ha
Target areas	ICH-5 and ICH-66 for rainfed conditions (peninsular India) ICH-6 All over India
Potential buyers of technology	Seed companies, FPOs, NSC, SSC, NGOs, Startups
Competitors of Similar technology	Public sector-IR-GCH-4*, GCH-7, GCH-8 (Mostly NW-region) RF-PCH-111*, YRCH-1*, YRCH-2 Private sector: NBCH-22, Mahyco hybrids Sold at Rs. 250-600 /kg
Estimated market for technology	ICH-5 and ICH-66 - 70,000 ha (350 tonnes seed/@ 5 kg seed/ha); ICH-6 >2 lakh ha (1000 tonnes seed /@ 5 kg seed/ha) Selling price Rs 300-500/kg
Cost of production	Rs 220-250/kg
Uniqueness	ICH-5, ICH-6 for RF, higher yield, W & LH Resistant; ICH-6 both RF & IR, W Resistant, Tolerant to all sucking pests
Anticipated social impact	Additional income of Rs 6000 to 9000/ha with an yield advantage & stability even under severe drought conditions

RF-Rainfed, IR-Irrigated

W-Fusarium wilt, LH-Leafhopper

(*wilt susceptible)

Castor pistillate line: M-574

*PI-Pistillate index

Pistillate nature	PI* of 0.9 compared to 0.7 for other lines
Seed yield	500 kg/ha
Special features	Resistant to wilt and leafhopper, Good combiner for seed yield and long primary spike M-74 based hybrids very stable performance across locations 2 to 2.5t/ha
Reg. with PPVFRA	2020

Contact: Dr. C. Lavanya (c.lavanya@icar.gov.in)

Hybrids released during the last 6 years

Name	Year of release	Yield (kg/ha)	Oil (%)	Days to first picking	Major traits /Res./Tol.	Recommended states
GCH-8	2018	3590 (IR)	48	100-130	W, RR, LH	All over India
YRCH-2	2018	2090 (RF)	48	110-115	W	Tamil Nadu
GCH-9	2018	3820 (IR)	48-50	110-120	W, RR	Gujarat
GNCH-1	2018	2545 (IR)	47-48	100-115	W, LH	Gujarat
ICH-66	2019	1550 (RF) 3375 (IR)	48-49	94-97	W, LH	RF zone -AP, TG,TN,KN, Odisha, MH
GCH-10	2020	3900 (IR)	50	90-110	W, LH	Gujarat
ICH-5	2021	1670	46-48	97-108	W, RR, LH	RF zone
Tilhan Tec ICH-6	2024	1100 (RF) 1900 (IR)	46-47	90-110	W, tol. to sucking pests	All over India

W-Wilt, RR-Root rot, LH-Leafhopper

IR-Irrigated, RF-Rainfed

AICRP linseed varieties available for Commercialization

Linseed varieties from AICRP centres

Name	Year of release	Potential yield (kg/ha)	Special features	Recommended area/states
Utera Alsi 2	2019	520	Oil:35.0%; MR to wilt and budfly	UP, Bihar, WB, Assam, MP, Chhattisgarh, Odisha, MS, Karnataka
Surya	2019	1431	Oil: 36.0%; MR to wilt, resistant to rust	Himachal Pradesh, Punjab
LSL-93	2019	960	Oil: 38.0%; ALA: 55%; early maturity (90 d)	Maharashtra
TL 99	2020	1274	First low ALA (<5%) variety of India	UP, Bihar, WB, Assam
Suvee	2020	1262	MR to wilt and budfly	Himachal Pradesh, Punjab
Kota Alsi-6	2021	1259	Oil: 36.0%; MR to wilt, Alternaria, budfly	UP, Bihar, WB, Assam
Kota Barani Alsi-6	2021	1224	MR to wilt, powdery mildew, Alternaria, budfly	Himachal Pradesh, Punjab

Linseed varieties from AICRP centres

Name	Year of release	Potential yield (kg/ha)	Special features	Recommended area/states
BUAT Alsi-4	2021	1261	MR to powdery mildew, Alternaria, budfly	MP, Chhattisgarh, Odisha, MS, Karnataka
Aparna	2021	1342	MR to powdery mildew, Alternaria, budfly	Himachal Pradesh, Punjab
RLC 164	2021	1161	Rest. to rust; MR to wilt, budfly	Himachal Pradesh, Punjab
RLC 167	2021	1131	Rest. to rust; MR to wilt, budfly	Himachal Pradesh, Punjab
Sabour Tisi-3	2021	547	For *Utera* cultivation; Rest. to wilt; MR to budfly	UP, Bihar, WB, Assam, MP, Chhattisgarh, Odisha, MS, Karnataka
RLC 171	2023	1175	MR to wilt	UP, Bihar, WB, Assam, MP, Chhattisgarh, Odisha, MS, Karnataka

Technology assessment

Considerations	Projections
Potential of the technology	Increase in seed yield: >1200 kg/ha from 500-700 kg/ha (Rainfed); 1700-2000 kg/ha from 1000-1200 kg/ha (Irrigated)
Target areas	Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Bihar, Jharkhand, Maharashtra
Potential buyers of technology	Seed companies, Public agencies, Farmer producer organizations, SSC, NGOs, Startups
Competitors of similar technology	SAUs, Public seed agencies
Estimated market for technology	Newly released varieties 1,00,000 ha (25,00,000 kg seed/25 kg seed per ha) Selling price: 90-120/kg
Cost of production	Rs. 25-30/kg
Uniqueness	Higher seed and oil yield, high ALA, Lignans, tocopherol, dietary fibre
Anticipated social impact	Additional income of Rs 7000 to 9000/ha with an yield advantage of 5 to 7q/ha

Thank you all for your kind attention

Microbial Biopesticide Technologies

भाकृअनुप
ICAR

भातिअसं
IIOR

Bacillus thuringiensis var. *kurstaki* DOR Bt-1 WP

Technology: Wettable Powder (W.P.) formulation of *B. thuringiensis* var. *kurstaki* Strain - DOR Bt-1, Serotype 3a3b3c (NAIMCC-B-01118)

Target pests: Pod borer, *Helicoverpa armigera* on pigeon pea (polyphagous pest) and semilooper (*Achaea janata*) on castor

Target agroecological zones: All pigeon pea growing areas of India

Validation & commercialization: Registered in 2005 under 9(3b) section with CIBRC vide registration no. CIR-511/2005(256)

Generated data on Toxicity, Chemistry, Bio-efficacy, Container Content Compatibility & Ecotoxicity for 9(3) registration (Permanent)

Benefits: Target specific & efficacious; Ecologically safe with no toxicity to humans, animals, non-targets including beneficial insects; Causes immediate feeding cessation & brings larval mortality within 2-4 days; Not phytotoxic, biodegradable and does not pollute the environment

License fee: Rs. 6,00,000/- + 18% GST

Contact: Director, ICAR-Indian Institute of Oilseed Research, Hyderabad

Suspension Concentrate (SC) formulation of DOR Bt-127

Technology: Suspension Concentrate (SC) formulation of *Bacillus thuringiensis* var. *kurstaki* strain DOR Bt 127 (MTCC 5976/NAIMCC-B-01463); SC formulation with mineral oil as carrier

Target pests: *Spodoptera litura*, *Helicoverpa armigera*, *Thysanoplusia orichalcea*, *Achaea janata* (Polyphagous pests). Can be extended to lepidopteran pests *viz*., *H. armigera* on pigeon pea, *Cnaphalocrocis medinalis* on rice, *Plutella xylostella* on cauliflower & cabbage

Status of evaluation:

- Studies for determination of potency completed
- Analytical test report for physicochemical & biological parameters generated including endotoxin quantification
- Completed 3 years of multi-location evaluation (29 locations) in AICRP (Soybean, Sunflower, Groundnut, Castor, Cotton) against *Spodoptera litura* & other lepidopteran defoliators
- Safety to natural enemies & phytotoxicity studies completed
- Shelf-life studies for formulation stored at 2 locations (Hyderabad & Akola) completed for 24 months
- Eco-toxicity data generated (mother culture & formulation) as per CIBRC 9(3) registration

Bt-127 SC

Control

Benefits: DOR Bt-127 strain effective at high temperatures (till 40^0C). Broad host range with potencies of 34833 IU/mg, 50200 IU/mg, 46205 SU/mg and 71,722 SU/mg against *H. armigera*, *A. janata, Spodoptera exigua* and *S. litura,* respectively

Parameter		Bt-127 SC
Heat viable spore count of Bt (log CFU/ml)		17.56
Toxin % by ELISA		5.0
Protein content (mg/ml)		49.3
Presence of beta-exotoxin		Absent
Content of bio-control organism (%)		33.3
Human pathogen	Simmons citrate agar for *E. coli*	Nil
	Salmonella spp.	Nil
	Shigella broth for *Shigella* spp.	Nil
	Vibrio agar for *Vibrio* spp.	Nil

Demonstration in Farmers Fields (87-100% reduction in lepidopteran pests)

- Soybean (Nizamabad, Telangana; *Kharif* 2017): Bt-127SC effectively reduced semiloopers & tobacco caterpillar & resulted higher yield (700 kg/acre) & BC ratio (2.36) compared to farmer's practice (450 kg/acre & 1.61)
- Castor (Mahabubnagar, Telangana; *Kharif* 2018): Bt-127SC effective against semilooper, tobacco caterpillar & hairy caterpillars & resulted higher yield (1053 kg/acre) & BC ratio (2.61) over farmer's practice (633 kg/acre & 1.84)
- Sunflower (Osmanabad, Maharashtra; *Kharif* 2019): Bt-127SC effective against semilooper, tobacco caterpillar & capitulum borer and recorded higher yield (502 kg/acre) & BC ratio (2.30) over farmer's practice (yield 362 kg/acre & BC ratio 1.94)

Bt-127 SC Control

Technology ready for transfer

Combination SC formulations of Bt with entomopathogenic fungi (*Metarhizium rileyi* / *Beauveria bassiana*)

Technology: Oil based Suspension concentrate (SC) formulations of Bt-127 in combination with the entomofungal pathogens *Metarhizium* (*Nomuraea*) *rileyi* and *Beauveria bassiana*

First report of storable combination formulation of Bt with fungus (Indian Patent No. 315134 dt. 28.6.2019)

Target pests: Effective against polyphagous lepidopteran pests *viz*., *Spodoptera litura*, *Helicoverpa armigera*, *Thysanoplusia orichalcea*, *Achaea janata.* Can be used against lepidopteran pests in several agricultural and horticultural crops

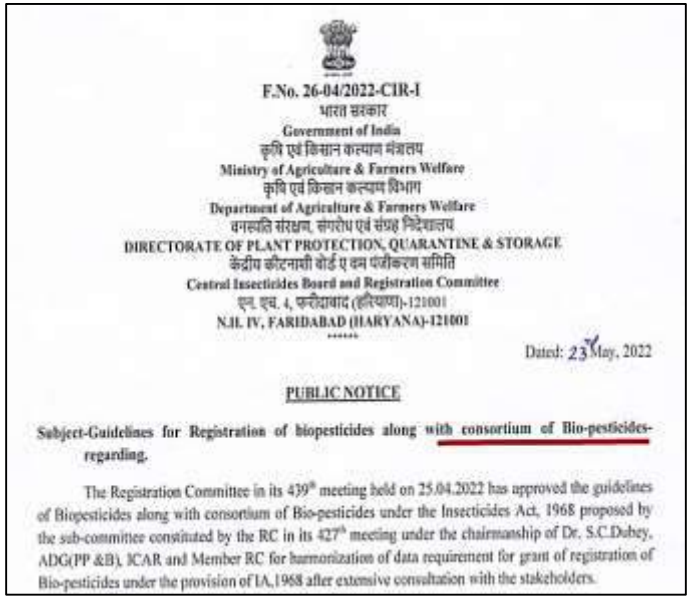
Validation & commercialization: Formulations effective against lepidopteran pests on sunflower (RARS-Nandyal & ORS-Latur) & on castor (RARS, Palem & TCRS, Yethapur)

Sunflower (% Reduction)	Bt + Mr SC	Bt + Bb SC
H. armigera	76.4-100%	76.4-90.7%
T. orichalcea	87.9-100%	70.2-74.8%

Castor (% Reduction)	Bt + Mr	Bt + Bb
S. litura	94.5-98.7%	90.1-91.8%
A. janata	86.1-98.5%	90.6-94.4%

Combination SC formulations of Bt with entomopathogenic fungi (*Metarhizium rileyi* / *Beauveria bassiana*)

Parameter		Bt+Bb-SC	Bt+Mr-SC
Heat viable spore count of Bt (log CFU/ml)		17.47	17.3
CFU (log CFU/ml) of *B. bassiana*		15.10	-
CFU (log CFU/ml) of *M. rileyi*		-	12.2
Toxin % by ELISA		4.67	4.67
Protein content (mg/ml)		46.3	43.3
Presence of beta-exotoxin		Absent	Absent
Content of bio-control organism (%)		38.6	37.4
Human pathogen	Simmons citrate agar for *E. coli*	Nil	Nil
	Salmonella differential agar for *Salmonella* spp.	Nil	Nil
	Shigella broth for *Shigella* spp.	Nil	Nil
	Vibrio agar for *Vibrio* spp.	Nil	Nil



F.No. 26-04/2022-CIR-I
भारत सरकार
Government of India
कृषि एवं किसान कल्याण मंत्रालय
Ministry of Agriculture & Farmers Welfare
कृषि एवं किसान कल्याण विभाग
Department of Agriculture & Farmers Welfare
वनस्पति संरक्षण, संगरोध एवं संग्रह निदेशालय
DIRECTORATE OF PLANT PROTECTION, QUARANTINE & STORAGE
केंद्रीय कीटनाशी बोर्ड एवं पंजीकरण समिति
Central Insecticides Board and Registration Committee
एन. एच. 4, फरीदाबाद (हरियाणा)-121001
N.H. IV, FARIDABAD (HARYANA)-121001

Dated: 23 May, 2022

PUBLIC NOTICE

Subject-Guidelines for Registration of biopesticides along with consortium of Bio-pesticides-regarding.

The Registration Committee in its 439th meeting held on 25.04.2022 has approved the guidelines of Biopesticides along with consortium of Bio-pesticides under the Insecticides Act, 1968 proposed by the sub-committee constituted by the RC in its 427th meeting under the chairmanship of Dr. S.C.Dubey, ADG(PP &B), ICAR and Member RC for harmonization of data requirement for grant of registration of Bio-pesticides under the provision of IA,1968 after extensive consultation with the stakeholders.

- **Benefits:** Diverse modes of action; increased speed of kill; Shelf life of 24 months; combination microbial formulations promising for mitigating resistance development to Bt and green technology for management of wide range of pests in agricultural and horticultural crops
- Data generation for CIB registration is under way (CIBRC guidelines 23.5.2022 for Registration of Consortium of Bio-pesticides)
- Patent can be licensed to interested firms

INTELLECTUAL PROPERTY INDIA

Patent No. 315134 dt. 28.6.2019

Suspension Concentrate (SC) formulation of EPF, *Beauveria bassiana*

Technology: Suspension Concentrate (SC) formulation of entomopathogenic fungi (EPF), *Beauveria bassiana*; Suspension Concentrate formulation with mineral oil as carrier

Target pest: Pod borer, *Helicoverpa armigera* on pigeon pea (polyphagous pest)

Target agroecological zones: All pigeon pea growing areas of India

Validation & commercialization: Evaluated for efficacy against *H. armigera* & other lepidopteran pests on pigeon pea under AICRP (Pigeon pea)

Data for provisional registration under section 9(3b) generated

Eco-toxicity data needs to be generated as per registration guidelines to enable licensing data for complete registration

Benefits: The formulation is not phytotoxic, eco-friendly and safe to non-target organisms & beneficial insects.

Contact: Director, ICAR-Indian Institute of Oilseed Research, Hyderabad

Trichoderma harzianum Th4d SC (Triguard Th-L)

The technology offered is the Suspension Concentrate (SC) formulation of *Trichoderma harzianum* Th4d (NAIMCC –F-02188) which is first of its kind in the country

- **Shelf-life:** 24 months at 25-35°C. The SC formulation will have a minimum of 2 x 10^6 cfu/ml even at 18th month after storage in room temperature
- **Patented production process:** Indian patent no. 316651.
- **Target diseases and crops:** Phytophthora seedling blight, Macrophomina root rot and Fusarium wilt of safflower and castor, Botryotinia gray mold of castor and Alternariaster leaf blight and powdery mildew of sunflower.
- **Method of application:** The formulations can be used for seed treatment @ 1ml/kg seed or 500 ml in 500 litre of water/ha and foliar spray
- **Target agroecological zones/states:** Telangana, Tamilnadu, Maharashtra
- **Validation:** Technology validated over 5 years in multi-location field trials conducted under AICRP on castor, sunflower and safflower.
- **Benefits:** Endophytic root colonizer, Defense inducer, Plant growth promotion and high seed yield, Good shelf-life, Broad host range, Low dosage.

T. harzianum,Th4d 20% SC (Triguard Th-L)

Triguard Th-L treated

Control

Field Trial at Parbhani (MS) in safflower crop during 2015-16, (*Var*.PBNS 12)

Trichoderma harzianum Th4d WP (Triguard Th-P)

- The technology offered is the biocontrol agent *Trichoderma harzianum* Th4d 1.5% WP formulation
- **Shelf-life:** 18 months at 25-35°C. The formulation will have a minimum of 2 x 10^6 cfu/gm even at 18^{th} month after storage in room temperature.
- **Patented production process:** Indian patent no. 316651
- **Target diseases and crops**: Phytophthora seedling blight, Macrophomina root rot and Fusarium wilt of safflower and castor, Aspergillus root rot in groundnut.
- **Method of application:** The formulation can be used for seed treatment @10g/kg.
- **Target agroecological zones/states:** Telangana, Tamilnadu, Maharashtra
- **Validation:** Technology validated over 8 years in multi-location field trials conducted under AICRP on castor and safflower.
- Technology dossier for 9.3 (b) registration with CIB & RC.
- **Benefits:** Endophytic root colonizer, Defence inducer, Plant growth promotion and high seed yield, Good shelf-life, Broad host range, Low dosage.

T. harzianum, Th4d 1.5% WP (Triguard Th-P)

Left-Control; Right-Treated

Triguard Th-P

Control

Field Trial at Palem (TS) in groundnut crop during 2018-19, (*Var*. K-6)

Trichoderma asperellum TaDOR 7316 WP (Triguard Ta-P)

- The technology offered is wettable powder formulation of thermotolerant strain of *Trichoderma asperellum* Tv 7316 5% WP . *Trichoderma asperellum* TaDOR7316 (MTCC 5623)
- **Shelf-life:** 18 months at 25-35°C. The formulation will have a minimum of 2×10^6 cfu/gm even at 18^{th} month after storage in room temperature.
- **Patented production process:** Indian patent no. 359123
- **Target diseases and crops:** Phytophthora seedling blight, Macrophomina root rot and Fusarium wilt of safflower.
- **Method of application:** The formulation can be used for seed treatment @ 10g/kg
- **Target agroecological zones/states:** Telangana, Tamilnadu, Maharashtra
- **Validation:** Technology validated over 5 years in multi-location field trials conducted under AICRP on safflower.
- Technology dossier for 9.3 (b) registration with CIB & RC.
- **Benefits:** Endophytic root colonizer, Defence inducer, Plant growth promotion and high seed yield, Good shelf-life, Broad host range, works well under high temperature and moisture stress.

Triguard Ta-P

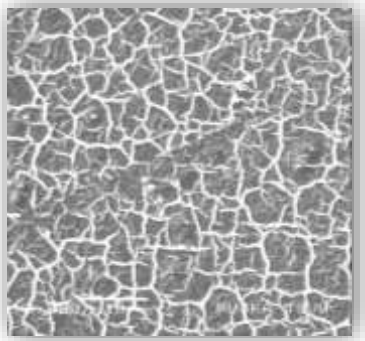
Control

Field Trial at Solapur (MS) in safflower crop during 2013-14, (var. *Phule Kusum*)

Biopolymers (Chitosan and cellulose) developed as a stable crosslinked film coating polymers with *Trichoderma* for seed coating and evaluated against soil borne diseases in oilseeds crops

Biopolymer (Chitosan) Film

Chitosan+ *Trichoderma* film



Biopolymer Film Matrix -SEM

Physical, structural and chemical characterization showed suitability of the film for uniform seed coating

Biopolymer Chitosan (Cts)- Th4d

Groundnut, Sunflower Seed coated with biopolymer + *Trichoderma*

Groundnut, Sunflower Seeds coated with *Trichoderma* powder

Biofilm Cellulose-Th4d

International Journal of Biological Macromolecules 126 (2019) 282–290

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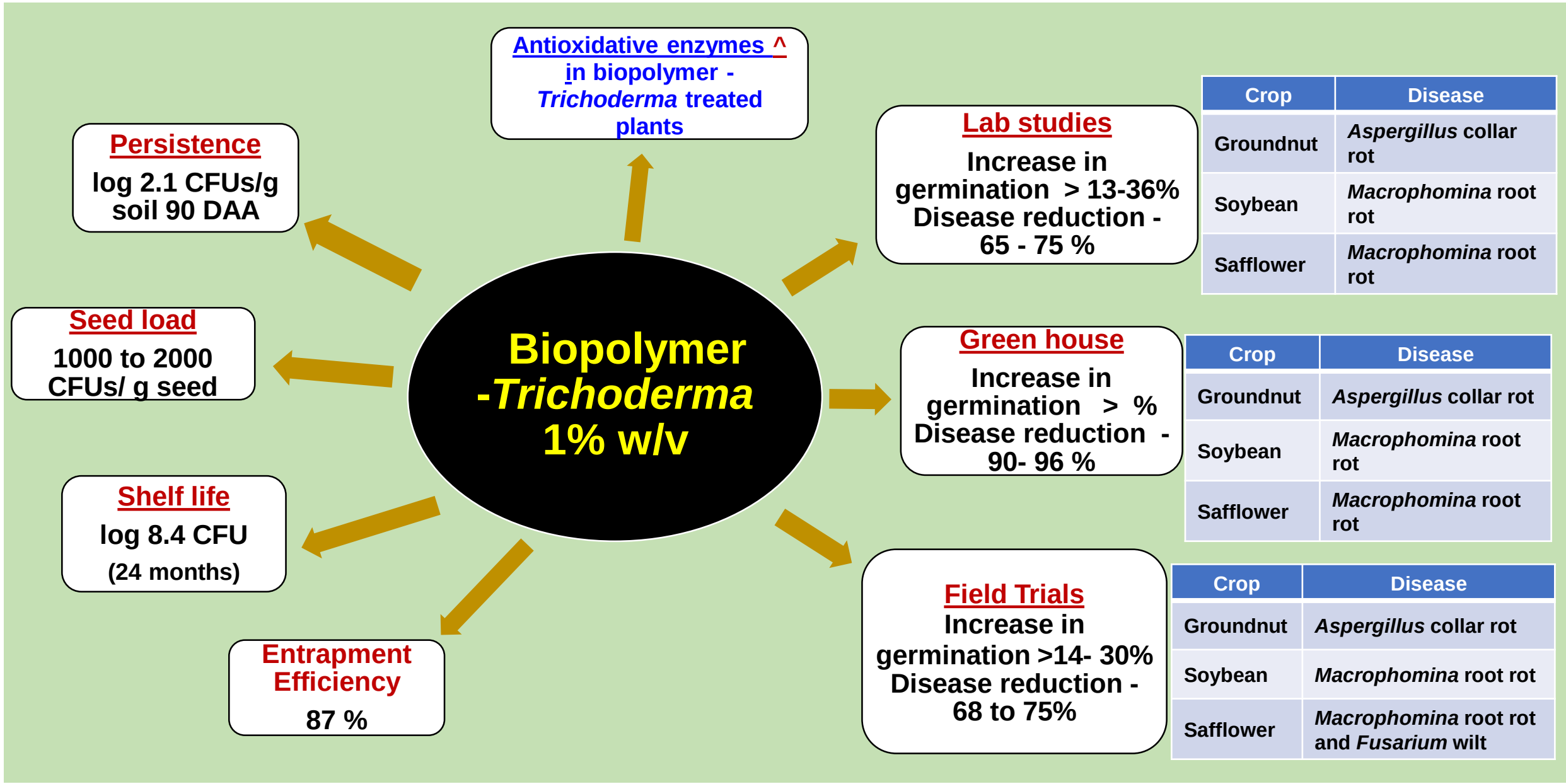
journal homepage: http://www.elsevier.com/locate/ijbiomac

Development of chitosan-PEG blended films using *Trichoderma*: Enhancement of antimicrobial activity and seed quality

K.S.V. Poorna Chandrika [a,*], R.D. Prasad [b], Varsha Godbole [b]

NAAS rating 12.95

Patent granted: A polymer composition and a process for its preparation (Patent No. 202141015658A)



Crop	Disease
Groundnut	*Aspergillus* collar rot
Soybean	*Macrophomina* root rot
Safflower	*Macrophomina* root rot

Crop	Disease
Groundnut	*Aspergillus* collar rot
Soybean	*Macrophomina* root rot
Safflower	*Macrophomina* root rot

Crop	Disease
Groundnut	*Aspergillus* collar rot
Soybean	*Macrophomina* root rot
Safflower	*Macrophomina* root rot and *Fusarium* wilt

Prasad, R.D., Poorna Chandrika, K. S. V., Varsha G., 2020. A novel chitosan biopolymer based *Trichoderma* delivery system: Storage stability, persistence and bio efficacy against seed and soil borne diseases of oilseed crops. *Microbiol. Res.* 237:126487. *(NAAS rating - 9.9)*

Biopolymer-*Trichoderma* based Seed Coating Technology and Disease Management

Soybean

In multilocation field evaluation under AICRP -Soybean, seed treatment with *combination of chitosan+ T. harzianum, Th4d and thiamethoxam* performed on par with fungicide (penflufen + trifloxystrobin) + thiamethoxam in management of root rot, stem fly and girdle beetle at 4 locations
(Jabalpur, Amaravathi, Dharwad and Adilabad)

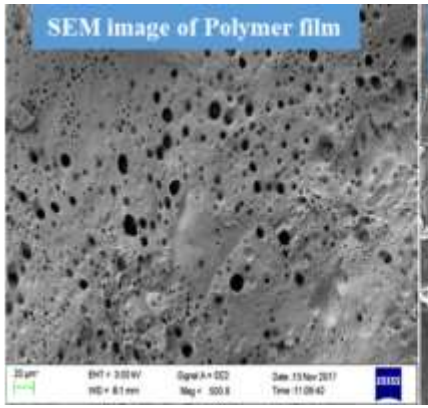
Groundnut

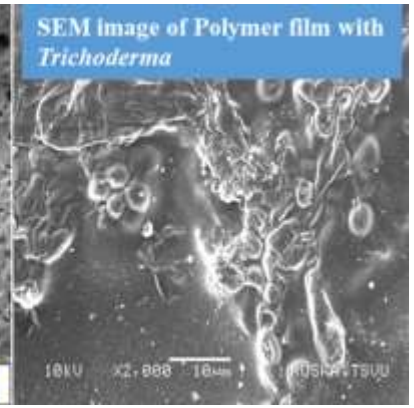
In field evaluation at two locations, *Ch-Th4d* and *Cellulose-Th4d* treatments have shown low root rot incidence (5.7 and 4.6%), pod yield (2887 and 2900kg/ha) compared to a very low germination of 61%, high root rot incidence of 17.5% root rot incidence and low pod yield (1662kg/ha)

Safflower

In multilocation field evaluation under AICRP -Safflower, seed treatment with *chitosan+ T. harzianum, Th4d seed treatment (Ch-Th4d) found to be effective against Fusarium wilt and root rot and comparable to fungicide penflufen + trifloxystrobin at* 5 locations (Solapur, Tandur, Hyderabad, Parbhani, Annigeri) over 2-3 years

Biopolymer Cellulose –*Trichoderma harzianum* Th4d 0.2% w/w



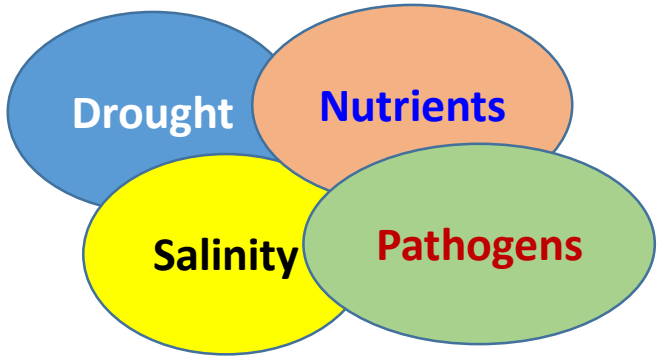


Salient features:

- Synthesis by physico-chemical crosslinking polymerization technique and followed by solvent casting method.
- Entrapped fungal spores range of 1.0 wt. % having cfu of 10^9 to 10^{12}
- Seed load: 1000 to 2000 CFUs/ g seed
- Shelf life: 10.3 log CFU (24 months)
- Entrapment efficiency: 94%
- Persistence: 10^6 CFUs/g soil 90 DAA

Standardization of multilayer seed coating using layer-by-layer strategy with biopolymeric films and crop inputs (microbes, insecticides, fungicides)

Biotic and abiotic stresses



Direct seed treatment with multiple inputs

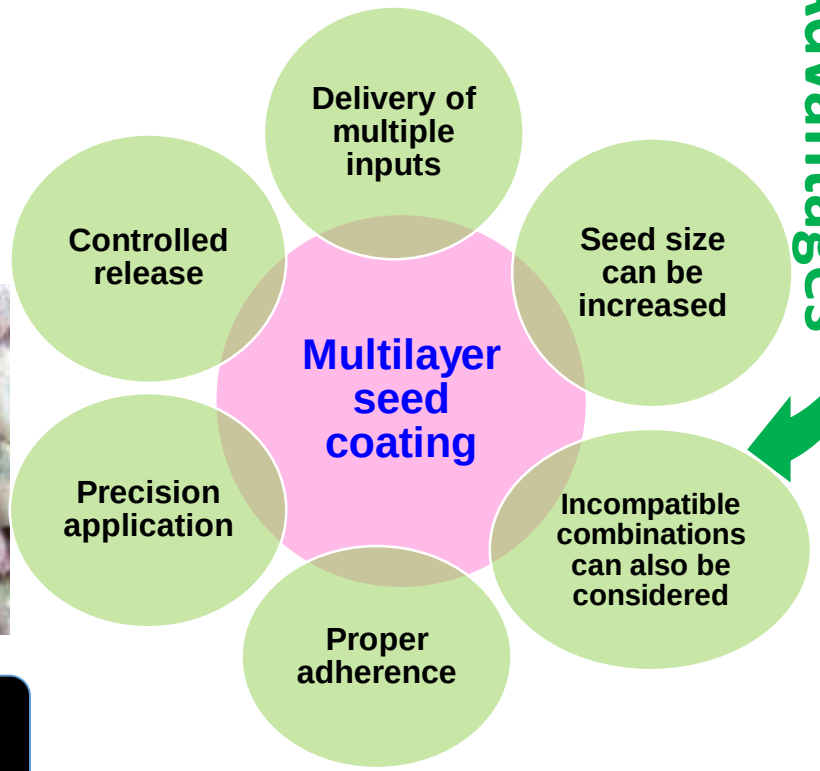
Constraints

- Physical incompatibility
- Environmental pollution
- Change in chemical characteristics
- Antagonistic interactions
- Wastage
- Improper adherence
- Toxicity and adverse effects

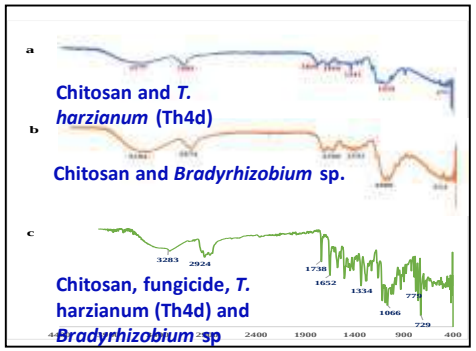
Seed quality and germination issues resulting in less plant stand and establishment

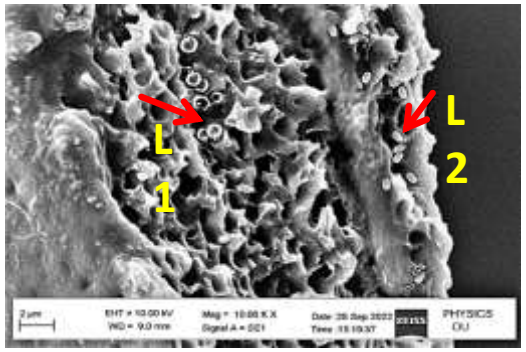
Multilayer seed coating with different inputs

Advantages



Physicochemical characterization (FT-IR, SEM) of double layer biopolymeric films and bioefficacy testing





L1: Chitosan+ Fungicide+ Th4d
L2: Chitosan+ *Bradyrhizobium* sp.

The double layer film FT-IR spectra and SEM image shows the physical and chemical integrity of the film is intact. The film forms the fine layer around the seed with separation between the two layers as depicted in the SEM imaging.

Double-layer seed coating (Layer 1: Chitosan 5ml + Penflufen + Trifloxystrobin 7.5ml + Th4d 0.1g and Layer 2: Chitosan + Thiamethoxam) has improved seed germination and reduced root rot incidence in groundnut, soybean and sesame crops

Persistence, root colonization and shelf life of *T. harzianum* (Th4d) and *Bradyrhizobium* in double layer biopolymer films/on coated seed in red and black soils has been studied

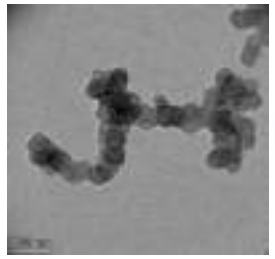
- An increase in CFUs of *Trichoderma* and *Bradyrhizobium* up to 90 days in double layer film added red and black soils.
- Population of *Trichoderma* and *Bradyrhizobium* remained unaffected on double layer coated groundnut seed during 4 months of storage

Trichoderma Biocomposites

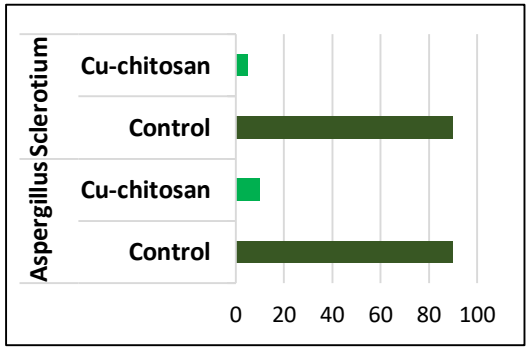
Chitosan- Cu Nano composites (40 nm)-*Trichoderma* formulation for **Seed treatment**

- Entrapping the biocontrol agent (*Trichoderma*) will improve the bio efficacy, and gives wider applicability of the biocontrol agents.
- Seed treatment with nano composite showed around 90% root & collar rot disease reduction in groundnut

Cu-Chitosan nano polymer -Th4d

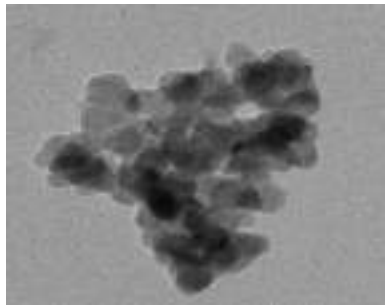


TEM image

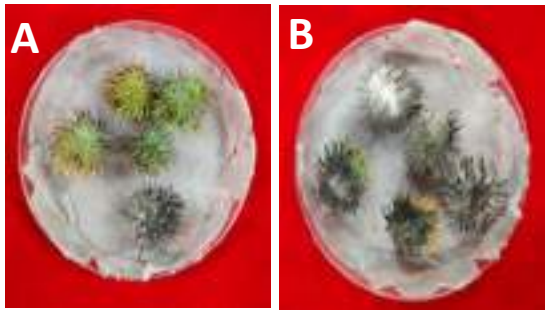


Chitosan- Lignosulfonate Nano Coacervate (50 nm) based *Trichoderma* for **Foliar Applications**

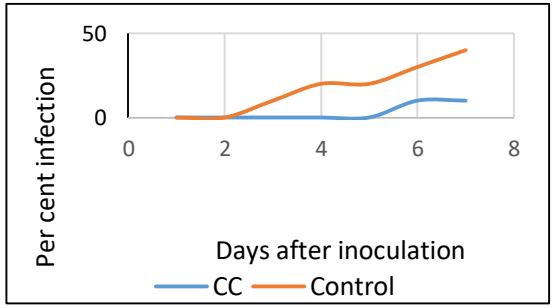
- To protect *Trichoderma* from the direct sunlight and adverse temperature variations for foliar applications, encapsulation of *Trichoderma* spores is necessary
- Disease development was delayed on the coacervate treated castor capsules and showed 66% reduction in gray mold disease.



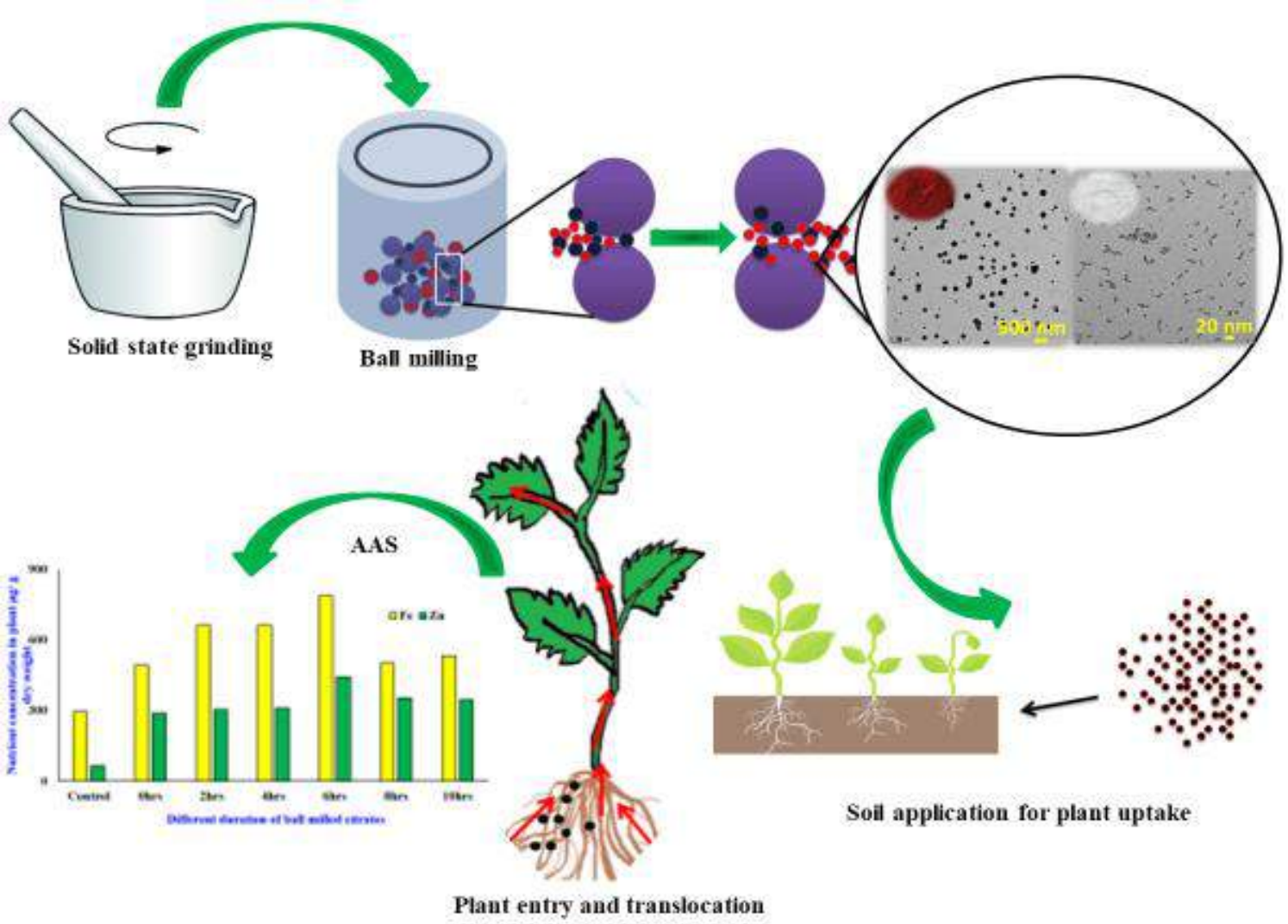
TEM images of nano coacervate



A . Coacervate Treated B. Untreated capsules



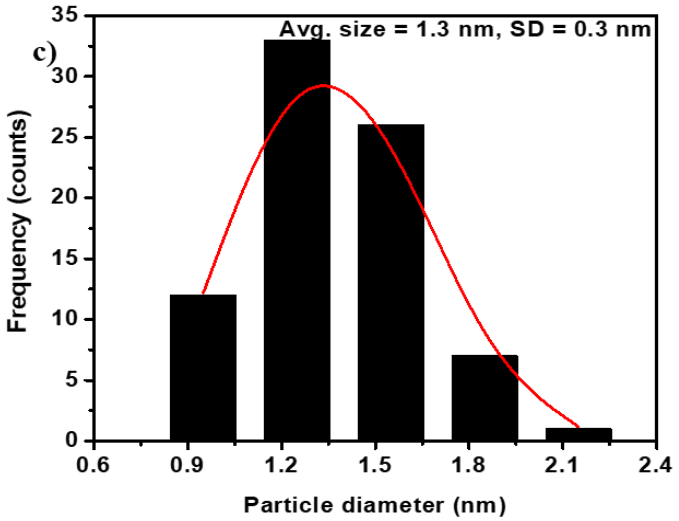
Synthesis of Fe and Zn nanosystems for soil application

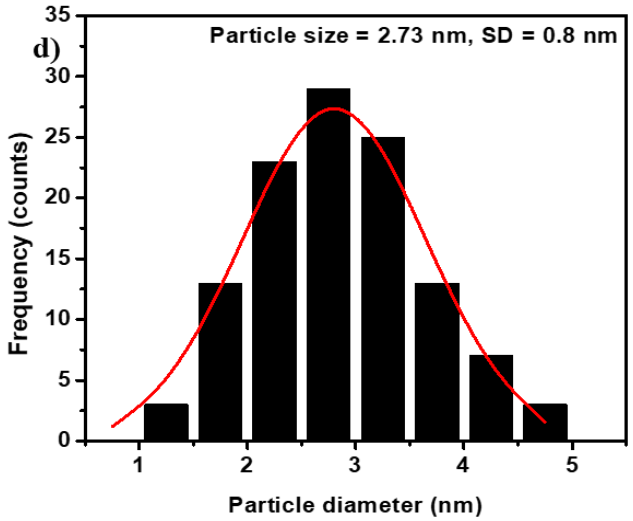


- Nano nutrients of Fe and Zn were synthesized using greener techniques like solid state grinding followed by ball milling.
- Fe and Zn nanosystems are synthesized in the form of nanochelators based of citrates.
- Evaluation of nanochelators of Fe and Zn micronutrients (developed at IIOR) on soybean and groundnut showed higher nutrient uptake compared to commercially available nano-micronutrients.

Confirmation of Particle size of the synthesized citrates

Fe and Zn Nanonutrients





Size of FC (1:1) is 195.2 nm
ZC (1:3) is 74.5 nm
Fe-citrate nano particles (1:1) - 6 hrs- 2.73 nm
Zn-citrate nano particles (1:3)- 6 hrs - 1.3 nm

The nano particle size has been confirmed and was found in the range of 1.3-2.73 nm

Fe and Zn content in citrates

Treatment	Fe/ Zn content (%)
FC (1:1)	20.7
FeSO4	19.5
Chelated- Fe	12.0
Nano- Fe	12.0
ZC (1:3)	29.8
ZnSO4	21.0
Chelated- Zn	12.0
Nano- Zn	12.0

The Fe content and Zn content in citrates were evaluated and compared with market available Fe and Zn.

K.S.V. Poorna Chandrika, Dinabandhu Patra, Praduman Yadav, A. Aziz Qureshi, and Balaji Gopalan, Metal citrate nanoparticles: a robust water-soluble plant micronutrient source. RSC Advances, 2021,11, 20370-20379. (NAAS ratings- 9.12)

K.S.V. Poorna Chandrika, A. Aziz Qureshi, Anupama Singh, Chunduri Sarada, and Balaji Gopalan. Fe and Zn Metal Nanocitrates as Plant Nutrients through Soil Application. ACS Omega, 2022, 7 (49), 45481-45492. (NAAS rating- 10.13)

Lignin from agricultural waste and its applications in agriculture and industry

Chopped castor stalk

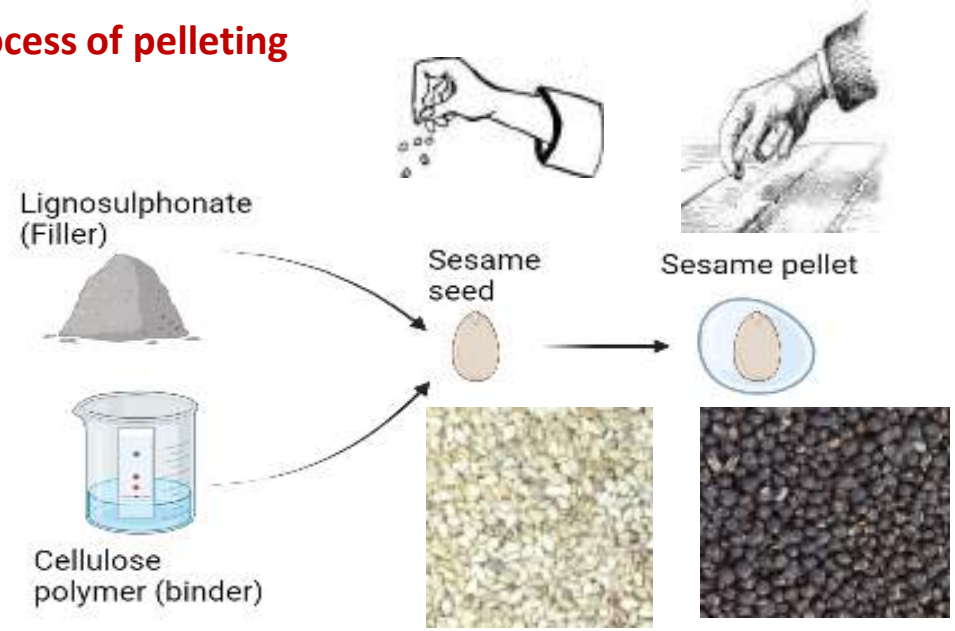
Azeotropic mixture

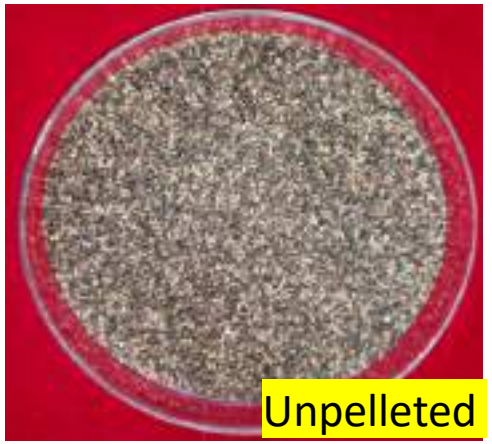
Castor stalk lignin

- Lignin content varied from 12 to 28%.
- Lignin extraction confirmation was done through FTIR at two different peaks 3347 and 2920

Application of Lignin derivative-Seed pelleting in sesame

Process of pelleting





Physical properties of pelleted seeds

Treatment	Test weight (1000 seeds) in g.	Distilled Water (in min)
Sesame seeds	2.85-4.06	-
Pelleted with lignosulphonate	10.3-11.5	1.15
Pelleted with lignosulphonate + Sesame cake	10.5-13.4	3.54

Germination testing of pelleted seeds

Treatment	Speed of germination	
	In sand	By roll paper towel method
Lignosulphonate + 30% cellulose	6.81	10.2
Lignosulphonate + 30% cellulose + Sesame cake (1:1)	2.79	5.7
Unpelleted (control)	7.02	10.8

- 100% lignosulphonate has potential as filler material for seed pelleting process

A-Lignosulphonate
B-Lignosulphonate + SCake
C- Control

This is under field evaluation for different sowing methods

Pelleting of 100% Lignosulfonate resulted in on par speed of germination compared to unpelleted

TECHNOLOGIES FOR SESAME AND NIGER

A.K.Vishwakarma

Project Coordinator (Sesame & Niger)

INDIAN COUNCIL OF AGRICULTURAL RESEARCH

PCUS-18-1(Unnat Rama)

Seed coat colour	Dark Brown
Maturity	85-90 days
Salient features	Suitable for Rabi summer cultivation. Days to maturity: 86-90 Yield: 9.51 q/ha Oil content: 46.35% Mod. resistant to Macrophomina stem and root rot and Alternatia leaf spot, Cercospora leaf spot, mod. resistant to leaf Webber, Capsule borer, leaf hopper and mirid bug
States proposed for	Zone I :Maharashtra, Telangana, Karnataka, Zone II :Andhra Pradesh, Bihar, Madhya Pradesh and Zone III: Odisha, Andhra Pradesh, West Bengal and Tamil Nadu
Contact Detail	Dr. Rajani Bisen, Principal Scientist, Project Coordinating Unit (Sesame & Niger), JNKVV Jabalpur 482004. Email: rajanitomar20@gmail.com, 9425483648

TilhanTec Til-1

Maturity	90 days
Seed yield	950 kg/ha
Oil content	45%
Recommended areas	Karnataka, Maharashtra, Telangana, Odisha, West Bengal, Tamil Nadu
Special features	Moderately resistant to root and stem rot, leaf spots, leaf webber and capsule borer, leaf hopper
Year of release	2023

Contact	Dr. R.K. Mathur, Director, ICAR-Indian Institute of Oilseeds Research Tel: +91-40-24598444, 24016141 Mobile : +91- 944044196, director.iior@icar.gov.in

G.Til 11 (AT 324)

Recommended area (states)	:	Zone-I (Telangana, Maharashtra, Karnataka), Zone-II (West Bengal, Madhya Pradesh, Bihar, Andhra Pradesh) and Zone-III (West Bengal, Tamil Nadu) and for all India
Suitability	:	Irrigated/Timely sown
Salient features	:	Average grain yield : 8.42 q/ha Maturity 92 days Seeds are black and bold, Oil content 47.47 % Moderately resistant to Macrophomina stem & root rot and resistant to Alternaria leaf spot, Cercospora leaf spot and Phyllody
Contact Person		Dr.V.N. Gohil, Breeder (Sesame), Agril. Res. Station, Gujarat Agril. University, Junagarh Email: vanrajgohil11@gmail.com

		JCS 3202 (Telangana Til-I)
Recommended area	:	Zone I (Maharashtra, Karnataka and Telangana)
Suitability	:	Rabi/Summer- Irrigated
Salient features	:	➢ High yielding 8.51 q/ha (8.20-9.80 q/ha) late maturity, white seeded Maturity : 92 days (91-95 days) late maturity ➢ Plant height : 96.43 cm (89-106 cm) ➢ Oil content : 44.2 % (44-49%) ➢ Oil Yield : 355.2 kg/ha ➢ Quality traits: (medium size seed) ➢ Moderately resistant to Macrophomina stem and root rot, Alternaria leaf spot, Cercospora leaf spot and phyllody)
Contact Details		Dr. D. Padmaja, Scientist (Plant Breeding), AICRP on sesame RARS, Polasa, Jagtial Email:suhanigpb@gmail.com

MT-2013-3(BUAT Til-1)

Recommended area	States- U.P
Suitability	Rainfed
Salient features	Average grain yield (q/ha) : 4.5-5.5q/ha Maturity: 83-85 days White seeded, Bold Resistant to Mocrophomina, Cercospora leaf spot, Leafcurl and Bacterial leaf spot Diseases and resistant to Pod borer insect pest
Contact Details	Dr. Vijay Sharma, Breeder, BUAT, Banda UP

VRI-4

Year of Notification	2022. No.SO. 4065 (E) dated 31.08.2022
Parentage	VRI Sv 2 / GT 10
Duration	85-90 days
Season	Suitable for Rabi / Summer cultivation in all sesame growing zones of India
Yield	957 kg/ha
Reaction to major pests and disease	Moderately resistant to phyllody and dry root rot diseases and sucking pests
Special features	• Brown seed • Oil content: 50% • Oil yield: 380 kg/ha
Contact Details	Dr. A. Mahalingam, Asst. Prof. (PBG), AICRP on Sesame Regional Research Station, Vriddhachalam Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)

Gujarat Til 7 (Banas Gaurav)

Productivity (kg/ha.)	957
Days to maturity	88-94
Plant height (cm)	125-149 cm
No. of branches/plant	3.84-6.00
No. of capsules/plant	74-85
Length of capsule (cm)	2.5-2.8
Seeds/capsule	64-76
1000-seed weight (g)	3.19-3.50
Oil content %	48.55-49.82
Special Features	High yielding, profuse branching, white bold seeded and hig oil content Suitable for kharif season
Contact Details	Research Scientist (Castor-Mustard) Castor-Mustard Research Station, S. D. Agricultural University, Sardarkrushinagar Dist : Banaskanth

Locules number per capsule (Four)

Seed : Coat colour (white)

VRI 5 (VS 19036)

Recommended area	Tamil Nadu
Suitability	Irrigated and Rainfed cultivation
Salient features	➢ Average seed yield: 795 kg/ha ➢ Maturity: 75-80 days ➢ White seed ▪ Monostem / shy branching sesame type ▪ Suitable for high density sowing ▪ 52% Oil and 23.8% protein content ▪ Moderately resistant to stem and dry root rot, phyllody and powdery mildew diseases ▪ Moderately resistant to sucking pests and capsule borer
Contact person	Dr. A. Mahalingam, Asst. Prof. (PBG), AICRP on Sesame Regional Research Station, Vriddhachalam Tamil Nadu Agricultural University, Coimbatore (Tamil Nadu)

Jagtial Til 2 (JCS 2454)

Seed coat colour	White
Salient features	Suitable for Rabi summer cultivation Yield - 947-1030 kg/ha during summer Quality traits viz., Iron -130.07 mg/kg, Zinc - 69.8 mg/kg and Calcium - 12630 mg/kg Duration: 90-95 days Oil Content: 46.0 - 48.7 % Moderate Resistance to Powdery mildew and tolerance to Alternaria leaf spot.
States proposed for	Zone I :Maharashtra, Telangana, Karnataka, Zone II :Andhra Pradesh, Bihar, Madhya Pradesh and Zone III: Odisha, Andhra Pradesh, West Bengal and Tamil Nadu
Contact Detail	Dr. D. Padmaja, Scientist (Plant Breeding), AICRP on sesame RARS, Polasa, Jagtial Email:suhanigpb@gmail.com

Jagtial Til 2 (JCS 2454)

Seed coat colour	White
Salient features	Suitable for Rabi summer cultivation Yield - 947-1030 kg/ha during summer Quality traits viz., Iron -130.07 mg/kg, Zinc - 69.8 mg/kg and Calcium - 12630 mg/kg Duration: 90-95 days Oil Content: 46.0 - 48.7 % Moderate Resistance to Powdery mildew and tolerance to Alternaria leaf spot.
States proposed for	Zone I :Maharashtra, Telangana, Karnataka, Zone II :Andhra Pradesh, Bihar, Madhya Pradesh and Zone III: Odisha, Andhra Pradesh, West Bengal and Tamil Nadu
Contact Detail	Dr. D. Padmaja, Scientist (Plant Breeding), AICRP on sesame RARS, Polasa, Jagtial Email:suhanigpb@gmail.com

OUAT Kalinga Sesame-1/Ashrit(OSM-22)

Recommended area	Zone-III (For Odisha)
Name of Proposing Centre	AICRP on Sesame, Dhenkanal, Odisha
Suitability	Summer
Salient features	• Medium plant height (100cm) • Duration: 87-93days • Moderately resistance to Alternaria leaf spot, Phyllody, Powdery mildew, Macrophomina stem and root rot, Cercospora leaf spot . • Moderately resistant to leaf roller and capsule borer, leaf hopper and mirid bug. • Synchronous maturity, Late shattering type • Oil content- 45 to 48 % • Reddish brown colour seed • No. of Locules -Six
Contact Details	Dr. DibyaRanjan Mishra, Jr. Breeder, Deptt. of Plant Breeding

OSC-79(Kalinga Sesame 3-1)

Recommended area	Zone-III (For Odisha)
Suitability	Kharif
Salient features	• Average seed yield of 569 Kg/ha (Potential-740Kg/ha) • Medium maturity duration (80-83 days) • Medium plant height (85.5 to 112.9 cm) • Resistant to Alternaria leaf spot, moderately resistant to Macrophomina stem and root rot, Phytopthora blight, Powdery mildew, Cercospora leaf spot and Bacterial leaf spot. • Late shattering type • Oil content- 45 to 52 % • Cream colour seed
Contact Details	Dr. DibyaRanjan Mishra, Jr. Breeder, Deptt. of Plant Breeding and Genetics, AICRP on Sesame, Orissa University of Agril. & Tech., Dhenkanal

Sabour Til-1 (BRT-04)

Seed Coat	Black seeded
Maturity	84-90 days
Seed yield	992 kg/ha (950-1050 kg/ha)
Oil yield	42-44%
States proposed	Zone II: Bihar, West Bengal, Madhya Pradesh, Andhra Pradesh
Proposed by	Bihar Agricultural University, Sabour, Bihar
Features	Mod. resistant to Macrophomina stem and root rot, Alternaria leaf spot, Cercospora leaf spot and phyllody
Contact person	Dr Sima Sinha, Scientist, BAU, Sabour

RT 372

Recommended area	Zone I (Rajasthan, Haryana, Punjab, Gujarat, Himachal Pradesh, U.P, Maharastra, Nagaland and parts of Karnataka and Telangana states)
Suitability	Rainfed, Kharif, both high and low fertility conditions.
Salient features	Seed yield of 610 kg/ha, Shining white seed colour,86 – 90 days (Days to maturity), It is moderately resistant to macrophomina stem & root rot, phyllody and resistant to alternaria leaf spot, cercospora leaf spot, bacterial leaf spot and powdery mildew. Moderately resistant to leaf webber and capsule borer (Antigastra),Oil content 47.8%
Contact Details	Dr. Sita Ram Kumhar, Agricultural Research Station,Mandor, Jodhpur - Rajasthan Mob. 9413251053, 9784821500 Email:srkumhar@gmail.com

Single Plant View

RT 372 seed photo

Field View of RT 372

AAUDR 9304-14-4-1 (AST-1)

Recommended area	Zone I (Rajasthan, Haryana, Punjab, Gujarat, Himachal Pradesh, U.P, Maharastra, Nagaland and parts of Karnataka and Telangana states)
Suitability	As kharif til in upland situation
Salient features	Tolerant to lodging, responsive to fertilizer, suitable for upland situation Seed yield of 875 kg/ha, Days to maturity 65-75 days.
Contact Details	Dr. Ashutosh Roy, Chief Scientist Regional Agricultural Research Station Diphu Mob: +91 94 358 23 601 Email:ashutosh_rars@yahoo.com

JLT-408-2 (Phule Purna)

Recommended area	Summer in Khandesh and adjoining areas of Marathwada region of Maharashtra
Suitability	Summer- Irrigated
Salient features	➢ High yielding 7.05 q/ha (7.00-8.00 q/ha) with bold white seeded variety ➢ Maturity : 92 days (84-97 days) ➢ Oil content : 49.02 % (45-49%) ➢ Quality traits: (medium size seed) ➢ Resistant to Diseases: Resistant to Macrophomina stem and root rot, Alternaria leaf spot, Cercospora leaf spot and moderately resistance to phyllody)
Contact Person:	Principal Scientist, Oilseeds Research Station, Mahatma Phule Krishi Vidyapeeth, Jalgaon -

Jagtial Til 1 (JCS 1020)

Recommended area	Telangana State
Suitability	Summer
Salient features	Yield: 1050-1100 kg/ha White seeded, Oil content 46-49% Duration-85-95 days Mod. resistant to powdery mildew, cercospora leaf spot and phyllody
Contact Details	Dr. D. Padmaja, Scientist (Plant Breeding), AICRP on sesame RARS, Polasa, Jagtial Email:suhanigpb@gmail.com

SVT-222

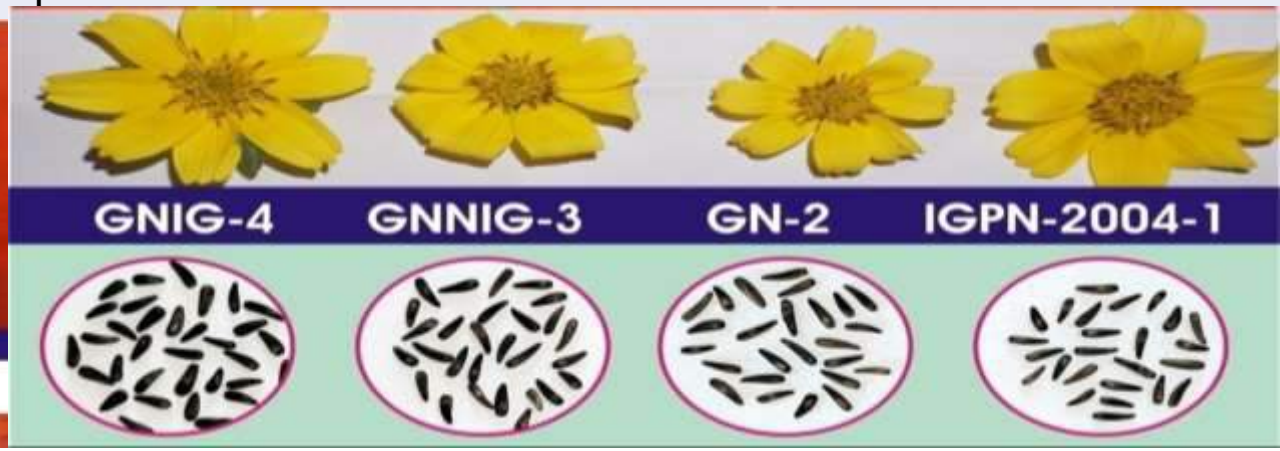
- **Potential yield: 1115 kg/ha**
- **Seed yield : 560-650 kg/ha Responded favourably 100% RDF.**
- **Resistance to macrophomina stem and root rot, phyllody and resistance to alternaria leaf spot, bacterial leaf spot, powdery mildew and cercospo leaf spot diseases.**
- **Bold seed (1000 seed wt. of 3.2g) with shiny white colour.**
- **Oil content 46.8%.**

Contact person: Mr. Ved Prakash Arya,Managing Director,Shakti Vardhak Hybrid Seeds Pvt. Ltd., Hisar

NIGER

GNIG-4

Suitability	:	Late Kharif season
Salient features	:	• The genotype belongs to mid late group (109-133 days) • The seeds are black and bold with test weight of 4.08 g • It gave an average seed yield of 543 kg/ha. • Contains 37.77% oil with oil yield of 205 kg/ha • Resistant against Alternaria and Cercospora leaf spot diseases and • Semilooper and Caterpillar
Recommended area	:	GUJARAT
Contact Details	:	Dr. Prashant K. Jagtap, Jr. Breeder, Niger Research Station, NAU, Vanarasi-396 580 Tal. Vansda, Dist. Navsari, Cell 09428688744, email pacific7@rediffmail.com PC Unit, ICAR, JNKVV, Jabalpur



JNS -2016-1413

Suitability	:	**Suitable for rainfed as well as irrigated hills and plain condition. Kharif Season**
Salient features	:	Yield: 650 -750 kg/ha Maturity: 90-100 days Tolerant to cercospora, Alternaria leaf spot, Powdery mildew, Niger caterpillar, White fly and leaf hopper High oil content =39.5%
Recommended area	:	Chhattisgarh and Jharkhand
Contact Details	:	Breeder/PC Unit AICRP on Niger, Zonal Agricultural Research Station, JNKVV, Chhindwara (Madhya Pradesh)

		JNS -521
Suitability	:	Suitable for rainfed as well as irrigated hills and plain condition.
Salient features	:	Shining black seed, tolerant to Alternaria leaf spots & powdery mildew diseases under field condition. Tolerant to aphids, semilooper and caterpillar Maturity 99 – 109 days Oil content 37-38% Average yield 550-600 kg/ha.
Recommended area	:	Madhya Pradesh
Contact Details	:	Breeder/ PC Unit, AICRP on Niger, Zonal Agricultural Research Station, JNKVV, Chhindwara (Madhya Pradesh)

		JNS -2015-9
Suitability	:	Suitable for rainfed as well as irrigated hills and plain condition.
Salient features	:	Moderately tolerant to aphids, semilooper and caterpillar. Tolerant to cercospora and Alternaria leaf spots & powdery mildew diseases under field conditions. Maturity 99 – 103 days; oil content 37-38% Average yield 550-600 kg/ha.
Recommended area	:	Madhya Pradesh
Contact Details	:	Breeder/ PC Unit, AICRP on Niger, Zonal Agricultural Research Station, JNKVV, Chhindwara (Madhya Pradesh)

		JNS -2016-1115
Suitability	:	Suitable for rainfed and irrigated condition
Salient features	:	Tolerant to cercospora leaf spots, alternaria leaf spots & powdery mildew diseases. Moderately tolerant to aphids, semilooper and caterpillar. Maturity 96 – 102 days Average yield 650-700 kg/ha, oil content: 39-40%
Recommended area	:	All India
Contact Details	:	Breeder/ PC Unit AICRP on Niger, Zonal Agricultural Research Station, JNKVV, Chhindwara (Madhya Pradesh)

Business Opportunities and Technologies Available for Commercialization at ICAR-IISR, Indore

Dr. Mahaveer P. Sharma
Principal Scientist (Agri. Microbiology)
& PI, Agri-business Incubation Centre &ITMU
ICAR- Indian Institute of Soybean Research Indore
Email: mahaveer620@gmail.com;
Mahaveer.Sharma@icar.gov.in

Soybean and Food Products

- India is now the fifth largest producer of soybean at a global level with more than 12.9 million tonnes production during 2022-23.
- Soy foods are nutritious, economical and provide many health benefits.
- Use of 10-20% of soybean along with cereals gives maximum nutritional advantages.
- Soy based technologies include soy milk, full fat soy flour, soy fortified biscuits, soy cheese, soy yoghurt, soy paneer (tofu), soy meat alternatives and soy chunks
- Presence of some antinutritional factors in soybeans requires careful processing/or use food specialty soybeans to make it fit for human and animal consumption.

Prospects of Entrepreneurship in Soy Food Processing

- Soy is a major ingredient in the food industry.
- Meat alternatives: tofu, tempeh, vegetarian burgers and frankfurters, meatless luncheon slices, canned meat analogs, ground soy burger, and soy bacon. Soy is used for textured vegetable protein in meal replacements and protein powders.
- Dairy alternatives: soy milk, soy creamers, soy yogurts, soy cheese etc.,
- Vegetable alternatives: soy may be is sold as fresh, frozen, and dried soybeans.

Prospects of Entrepreneurship in Soy Food Processing..

- Protein isolates (90% protein), soy protein concentrates (70% protein), and soy flour (50% protein content).
- Extruded, extracted, baked, fried, canned, frozen etc **(Technology based).**
- **Applications:** bakery and confectionary, meat products, functional foods, dairy products, and infant foods **(Zero lactose high calcium).**
- Vegan market trend, soy lecithin is another important byproduct, typically the brownish yellow complex mixture used as natural emulsifier.
- Cost effective production, abundant availability at affordable prices makes the major driver for the growth of the soy lecithin market.

Typical processing process

soaking

Soy bean

flaking

Heating grinding

defating

Soy Oil

OKARA

separation

Defatted Soy Flour

extraction

residue

Soy milk

gelation

Tofu (fine tx)

extract

Sup.

protein coagulation

Tofu (rough tx)

protein coagulation

Sup.

Soy Protein Isolate

sterilization

Protein ppt.

8

Processing for Defatted soy flour

flaking

defatting → Soy Oil

Defatted Soy Flour

extrusion → TVP

extraction → residue

extract

protein coagulation → Sup.

Protein ppt.

sterilization
drying

Soy Protein Isolate

Hydrolysis

Soy Peptide

Degraded bioactive peptide/biostimulant (organic fertilizer)

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

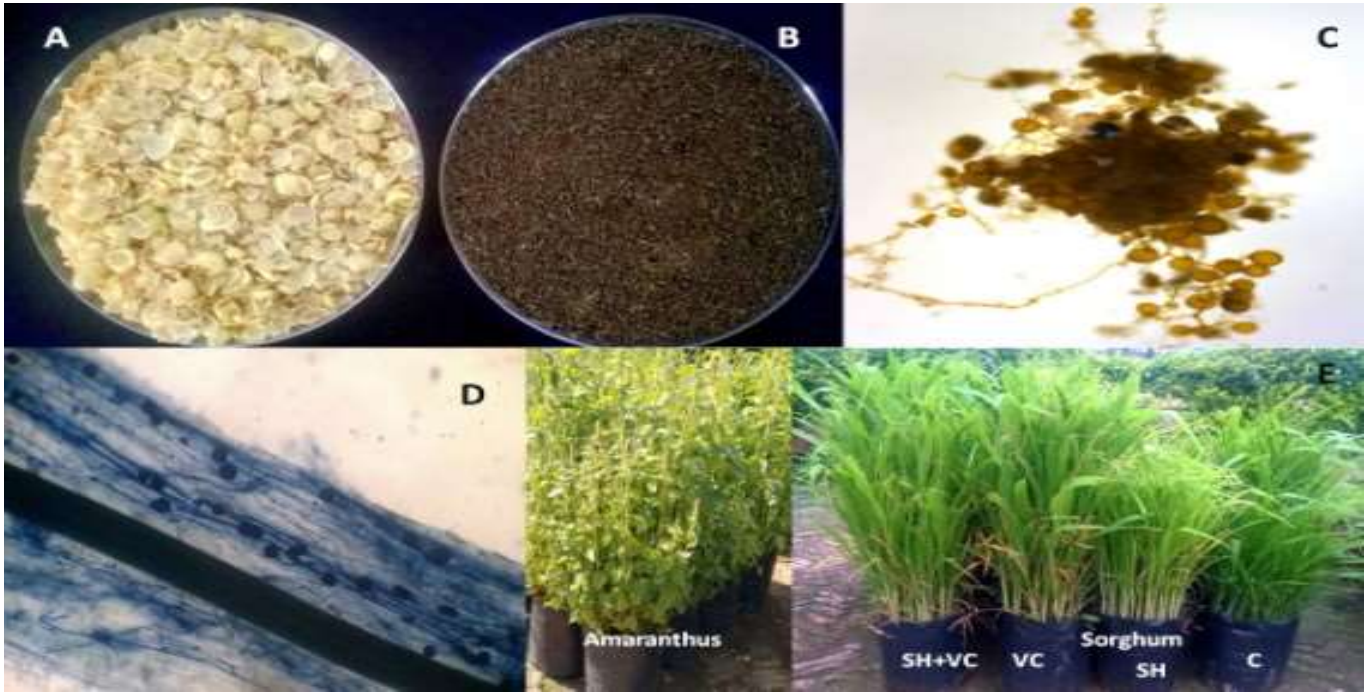
S. No.	Name of firm	Name of specialty soybean line/ variety	Year
1.	Suminter India Organics Pvt. Ltd., Andheri (w), Mumbai- 400053	NRC 181(Kunitz trypsin inhibitor free), high protein	2022
2.	Nature Bio Foods Limited, New Delhi	NRC 109 (Lipoxygenase -2 free soybean line)	2017
3.	Sonic Biochem Extraction 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)-NRC-127	2014
5.	ITC Limited, Secunderabad	NRC 102 (KTI-free) & IC 210 (high oleic acid)-NRC 147	2014

Technologies developed and commercialized (farm machineries) at IISR Indore

Farm machineries	Commercialized to (Non-exclusive license)
1. Broad bed furrow (BBF) Seed drill 2. Furrow irrigated raised bed system (FIRBS) 3. Subsoiler 4. Sweep seed drill 5. Ridge fertilizer drill cum seed planter 6. Broad bed furrow (BBF) planter 7. Soybean Seed planter 8. Single ridge seed planter 9. Soybean seed drill cum planter two in one	•SKB Agrotech Private Limited, Indore •New Patidar iron works, Indore •R.B Agro Industries, Indore •Rohit steel works, Chinchwad, Pune •Mahashakti Agro Energy& Innovation private Ltd, Wardha, Maharashtra •S.R. Engineering,Wardha, Maharashtra •Prabhat Krishi Yantra Pvt.Ltd, Sehore (MP)

Mass production of Arbuscular Mycorrhizal Fungi

Technology	Commercialized to
Mycorrhiza production technology (Microbial technology)	Biome technologies Pvt Ltd, Ahmednagar, Maharashtra



SOY PRODUCTS TECHNOLOGIES

available at ICAR-IISR, Indore for commercialization

TOFU

Nutritive value per 100 g:

1. **Calories: 147.29**
2. **protein: 9.25%**
3. **fat: 3.81%**
4. **minerals: 1.5%**

SOY MILK

Nutritive values per 100 g:

1. **Calories: 120.27**
2. **Protein: 9.65 %**
3. **Fat : 3.63%**
4. **Minerals: 0.24%**

SOY NUTS

Nutritive value per 100 g:

1. **Calories: 438.5**
2. **Protein: 47.8%**
3. **Fat : 12.5%**
4. **Minerals : 6.1%**

SOY DAHI

Nutritive values per 100 g:

1. **Calories: 51.84**
2. **Protein: 3.42%**
3. **Fat: 4.24%**
4. **Minerals: 0.25%**

SOY HALWA MIX

Nutritive values per 100 g:

1. **Calories: 300.5**
2. **Protein: 28.5%**
3. **Fat: 15.5%**
4. **Minerals: 5%**

SOY SEV

Nutritive value Per 100 g:

1. **Calories: 565**
2. **Protein: 30%**
3. **Fat: 45%**
4. **Minerals: 3.6%**

SOY MATHRI

Nutritive values per 100 g:

1. Calories: 231.5
2. Protein: 21.2%
3. Fat: 16.3%
4. Minerals: 5%

SOY COOKIES

Nutritive values per 100 g:

1. Calories: 293.9
2. Protein: 13.4%
3. Fat :26.7%
4. Minerals: 3.8 %


Soy Sev
Soy lassi
Soy flour
Soy Tofu
Soy nuts

SOY UPMA MIX

Nutritive values per 100 g:

1. Calories: 177.93
2. Protein: 12.6%
3. Fat: 14.17%
4. Minerals: 3.2%

SOY LADDOO

Nutritive values per 100 g:

1. Calories: 278.52
2. Protein: 28.5%
3. Fat: 18.3%
4. Minerals: 4.2%

DRIED OKARA

Nutritive values per 100 g:

1. Calories: 89.89
2. Protein: 4%
3. Fat: 8.21%
4. Minerals: 3.5%

PROCESSED SOY FLOUR

Nutritive values per 100 g:

1. Calories: 336.1
2. Protein: 37.6%
3. Fat: 18.3%
4. Minerals: 3.5%

Hand-holding services provided at IISR-ABI

- Full discloser of technologies chosen by incubatees
- Help in prototype development, trials, improvement, label design, shelf-life estimation
- Knowledge dissemination about financial aid e.g. Government schemes and subsidy, bank loan schemes.
- Rules and regulations involving plant design and fssai implementation

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

Mass production of *B. daqingense* culture/consortia in ABI Centre, IISR Indore (liquid formulation)



Microbial bioreactor/fermenter (100L Capacity-Liquid formulation)

- Easy to apply, socially highly acceptable; Higher self life up to 12 months
- Highly economic (one acre cost is Rs 50/- for 80 ml) (*semiautomatic)
- During 2023 produced about 8000 packets and supplied to farmers and KVKs

Our Current Incubates

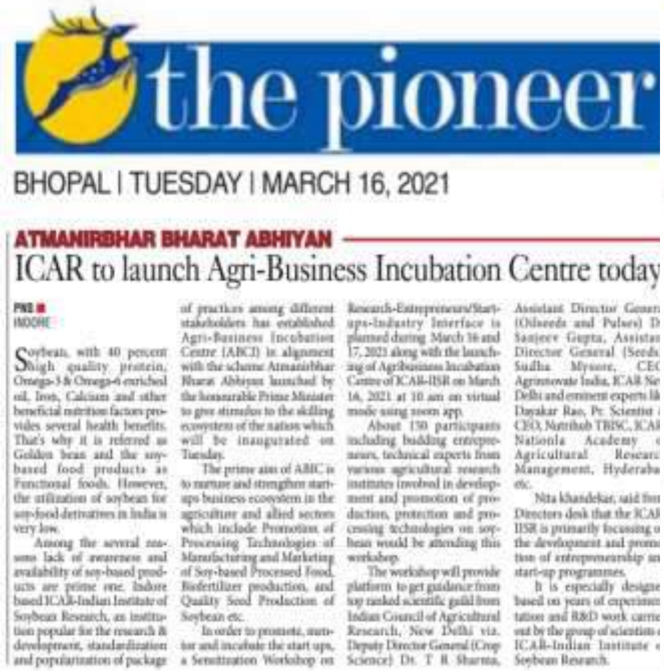
S. No.	Name of incubate	Name of Firm/Startup	Registration No.	Registration for services
1	Akash Phulari	Akash agro processing, Betul	-	Soy food processing
2	Harsh Bhajipale	Naked earth Indore 452009 (M.P.)	C/1626815	Soy food processing
3	Lalit Raghuwanshi	M/s Gudlak, Guna 473001 (M.P.)	-	Soy food processing
4	Sagar Manglani	Vegano cafe and kitchen, Indore (M.P.)	2623135	Soy food processing
5	Ayush Giri Goswami	Health mystic Pvt. Ltd. Betul 460001 (M.P.)	R55441810	Soy food processing
6	Anjali Bharti	Iraeco agro products and marketing Pvt. Ltd. Indore	-	Soy food processing
7	Vikram Shandilya Udaygiri	Earthistic produce, Bengaluru	KR03A0039304	Soy food processing
8	Sumit Patidar	Indore	-	Soy food processing
9	Kishan Raghuvanshi	Guna	-	Quality Seed Processing
10	Punit chourasiya	Jgdamba Bij Utpadak	Dr/kwa/1995	Quality Seed Processing
11	Dr Prafull Prabhakar Gadge	Biome Technologies Pvt. Ltd.	-	Production of microbial bioinoculants
12	Sunny Patel	Nextnode Bioscience Pvt. Ltd. Kadi, Gujarat	DIPP69037	Production of microbial bioinoculants
13	Niranjana Prabhu K J	Ecophytocare india private limited, Mysuru, Karnataka	DIPP97555	Production of Microbial Bioinoculants
14	Megha Gupta	Morph Industries Pvt. Ltd.	U24290MP2020PTC052241	Production of Microbial Bioinoculants
15	Yashvardhan Singh Rathore	Jaipur, Rajasthan	-	Production of Microbial Bioinoculants


Agriculture secretary visited ABIC IISR Indore


NABARD officials visited ABIC IISR Indore

Conducting orientation training on “Soy Products Processing and Byproduct Utilization for FPO of Sangali, Maharastra

Visibility in Media



जालना के 5 कृषक उत्पादक संस्थाओं के 25 सोया-कृषकों ने सोया खाद्य प्रसंस्करण व उपोत्पाद उपयोग पर प्राप्त किया प्रशिक्षण

सोयाबीन में हैं औषधीय गुण व अन्य लाभकारी तत्व

सोयाबीन से बने खाद्य पदार्थ

ICAR-ISSR training held on soybean processing

Indore Edition
Mar 16, 2023 Page No. 3
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महाराष्ट्र से जालना जिले के पांच कृषक उत्पादक संस्थाओं के 25 सोया-कृषकों ने

जालना के 25 सोया-कृषकों ने किया प्रशिक्षण प्राप्त

अहिल्या नगरी

राष्ट्रीय जनभावना

महाराष्ट्र के जालना जिले की 5 कृषक उत्पादक संस्थाओं के

25 सोया-कृषकों ने सोया खाद्य प्रसंस्करण एवं उपोत्पाद उपयोग पर भारतीय सोयाबीन अनुसन्धान संस्थान के कृषि व्यवसाय इनक्युबेशन केंद्र से किया प्रशिक्षण प्राप्त

दैनिक माधव एक्सप्रेस

देश

कृषि व्यवसाय इनक्युबेशन केंद्र से किया प्रशिक्षण प्राप्त

Jalna district Maharashtra's 25 farmers (5 FPOs trained during March 2023)

മെട്രോ വാർത്ത

ICAR-IISR holds training for farmers

STAFF REPORTER

Indore

ICAR-IISR on Wednesday held a training programme for soybean farmers under 'AICRP NSP Seed' and was attended by 45 soy growers of Malwa and Nimar region.

Seed production programme in-charge Mrinal Kochhar briefed farmers about the prevailing seed production status of popular varieties and emphasised on inclusion of medium/late duration varieties considering climate adversities.

Director KH Singh said the institute had been making all possible efforts for quality seed production, including recently released soybean varieties through various seed production programmes.

The institute also hosted a training programme on processing and utilisation of soybean for food uses" for 20 FPOs of Osmanabad district of Maharashtra through its agri-business incubation centre.

Incubation in-charge Maheswer Prasad Sharma said the institute had standardised processing techniques of soybean-based food products and the AIII centre was mentoring and incubating agri-startups and FPOs.

Indore Edition
Mar 30, 2023 Page No. 3
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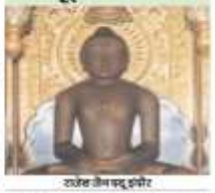
आज तक 3

राम नवमी को बन रहे हैं कई शुभ संयोग इसमें आराधना करने से होगी सभी की मनोकानाएं पूर्ण : डॉ. अशोक शास्त्री

एक सराहनीय अनूठा प्रयास



भारतीय सोयाबीन अनुसन्धान संस्थान द्वारा सोयाबीन बीजोत्पादन कृषकों के लिए कार्यक्रम का आयोजन तथा महाराष्ट्र के उत्मानाबाद जिले के 20 कृषक उत्पादक संस्थाओं के लिए प्रशिक्षण का समापन

दैनिक माधव एक्सप्रेस इंदौर इंदौर, गुरुवार 30 मार्च 2023 8

31 मार्च तक किये गए म्यूचुअल फंड के निवेश पर जारी रहेंगे दीर्घकालिक पूंजीगत लाभ

इन्फिनिक्स ने लॉन्च किया हॉट 30आई

भारतीय सोयाबीन अनुसन्धान संस्थान द्वारा सोयाबीन बीजोत्पादन कृषकों के लिए कार्यक्रम का आयोजन

महाराष्ट्र के उस्मानाबाद जिले के 20 कृषक उत्पादक संस्थाओं के लिए प्रशिक्षण का समापन

Osmanbad district Maharashtra's 90 farmers from 20 FPOs trained during March 2023

Acknowledgements

- IP&TM Division, ICAR HQ, New Delhi for funding ITMU and ABI Centre
- Director, ICAR-IISR Indore for the support and necessary permission
- Dr Neha Pandey, Scientist (Food Technology), IISR, Indore for providing information on soy food processing
- Organizers of this meet for the opportunity

Thank You

Hybrids/ varieties of ICAR-DRMR

P.K.RAI, Director
ICAR-Directorate of Rapeseed-Mustard Research
(Indian Council of Agricultural Research)
Sewar, Bharatpur-321303, Rajasthan

Vision

Brassica science for oil and nutritional security

Mission

Harnessing science and resources for sustainable increase in productivity of Rapeseed-Mustard

Mandate

- Basic, strategic and adaptive research on rapeseed-mustard to improve productivity and quality
- Provide equitable access to information, knowledge and genetic material to develop improved varieties and technologies
- Coordination of applied research to develop location specific varieties and technologies
- Technology dissemination and capacity building

DRMR Hybrid/ Varieties

Name of the Variety	Year of notification	Maturity (days)	Yield (kg/ha)	Oil Content (%)	Salient features	Area of Adaptability
NRCDR-2	2007	131-156	1951-2626	36.5-42.5	Suitable for Irrigated conditions	Zone-II (Delhi, Haryana ,Punjab, J&K and RJ)
NRC HB 101	2009/2017	105-135	1382-1491	35- 42	Suitable for late sown irrigated conditions	Zone-III (Eastern Rajasthan, MP, UP, UK), Zone-V (JHK, Bihar, Odisha, Assom, WB)
NRCHB 506 (Hybrid)	2009	127-148	1550-2542	39- 43	High adaptation	Zone-III (Eastern Rajasthan, MP, UP, UK),
NRCDR 601	2010	137-151	1939-2626	38.7-41.6	Timely sown irrigated	Zone-II (Delhi, Haryana, Punjab, J&K and RJ)
DRMR 1165-40	2020	142	2200-2600	41.2	Rainfed, timely sown	Zone-II (Delhi, Haryana, Punjab, J&K and RJ)
Giriraj (DRMRIJ 31)	2013	137-153	2246-2767	38.7-42.5	Timely sown irrigated	Zone-II (Delhi, Haryana, Punjab, J&K and RJ)
DRMR 150-35	2020	114	1200-1800	36.7-42.8	Rainfed condition	Zone-V (Orissa, WB, Bihar, Jharkhand, Chhattisgarh and Assam)
DRMR 2017-15 (Radhika)	2020	131	1686-1847	40.7	Late sown irrigated conditions	Zone-II (Delhi, Haryana, Punjab, J&K and RJ)
DRMRIC 16-38 (Brijraj)	2020	120-149	1733	37.6-40.9	Late sown irrigated conditions	Zone-II (Delhi, Haryana, Punjab, J&K and RJ)
DRMR 2018-19 (BPM-11)	2023	120-125	1649-2058	40-41	Late sown irrigated conditions	Zone III (MP,UP,UK and RJ)
NRCYS 05-02	2009	94-118	1056-1251	38.2-46.5	Yellow sarson growing areas of the country	

Indian Mustard: NRCDR 2

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	NRCDR 2
Year of Identification	2006, NRCDR-2
Year of notification and S.O. No.	122 (E), Dated 06-02-2007
Recommended Region / Areas	Zone II (Delhi, Haryana, Jammu & Kashmir, Punjab and Parts Of Rajasthan
Cultivar descriptor	Plant height : 165-212 cm Maturity : 131-156 days Oil content : 36.5-42.5% 1000 Seed wt.: 3.5-5.6 g
Special Attributes, If any	Tolerant to Salinity and high temperature at the time of sowing.
Yield	1951-2626 kg/ha

Indian Mustard: NRCHB 101

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	NRCHB 101
Year of Identification	2008, NRCHB 101
Year of notification and S.O. No.	454 (E), Dated 11-02-2009
Recommended Region / Areas	Zone-III (Eastern Rajasthan, MP, UP, UK), Zone-V (Jharkhand, Bihar, Odisha, Assom, WB)
Cultivar descriptor	Plant height : 170-200 cm Maturity : 105-135 days Oil content : 34.6- 42.1% 1000 Seed wt.: 3.6- 6.2 g
Special Attributes, If any	Suitable for late sown irrigated conditions
Yield	1382-1491 kg/ha

Indian Mustard hybrid NRCHB 506

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	NRCHB 506
Nature of the Cultivar (Variety/ Hybrid)	Hybrid
Pedigree (Plant-wise for Hybrids)	MJA 5 × MJR 1(mori CMS based)
Method of Breeding/Selection	Heterosis Breeding
Year of Identification	2008, NRCHB 506
Year of notification and S.O. No.	454 (E), Dated 11-02-2009
Recommended Region / Areas	Rajasthan and Uttar Pradesh
Cultivar descriptor	Plant height : 180-205 cm Maturity : 127-148 days Oil content : 38.6- 42.5% 1000 Seed wt.: 2.9- 6.5 g
Special Attributes, If any	High oil content
Yield	1550-2542 kg/ha

Indian Mustard: NRCDR 601

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	NRCDR 601 (DRMR 601)
Year of Identification	2009, NRCDR 601
Year of notification and S.O. No.	733 (E), Dated 01-04-2010
Recommended Region / Areas	Zone II (Delhi, Haryana, Jammu & Kashmir, Punjab and parts of Rajasthan)
Cultivar descriptor	Plant height : 161-210 cm Maturity : 137-151 days Oil content : 38.7- 41.6% 1000 Seed wt. : 4.2- 4.9 g
Special Attributes, If any	Suitable for timely sown irrigated condition
Yield	1939-2626 kg/ha

Indian Mustard: DRMR IJ-31 (Giriraj)

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	DRMR IJ-31 (Giriraj)
Year of Identification	2013, DRMR IJ-31
Year of notification and S.O. No.	2816 (E) Dated 19-09-2013
Recommended Region / Areas	Zone II (Delhi, Haryana, Jammu & Kashmir, Punjab and parts of Rajasthan)
Cultivar descriptor	Plant height : 180-210 cm Maturity : 137-153 days Oil content : 38.7-42.5% 1000 Seed wt. : 3.1-6.1 g
Special Attributes, If any	Suitable for timely sown irrigated condition
Yield	2246-2767 kg/ha

Indian Mustard: DRMR 150-35

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	DRMR 150-35 (Bharat Sarson 7)
Year of Identification	2015, DRMR 150-35
Year of notification and S.O. No.	SO 3482 (E) Dated 07-10-2020
Recommended Region / Areas	Zone-V (Orissa, WB, Bihar, Jharkhand, Chhattisgarh and Assam)
Cultivar descriptor	Plant height : 164-186 cm Maturity : 114 days Oil content : 36.7-42.8 % 1000 Seed wt.: 3.0-6.2 g
Special Attributes, If any	Suitable for rainfed situation
Yield	1200-1800 kg/ha

Indian Mustard: DRMR 1165-40

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	DRMR 1165-40 (Rukmini)
Year of Identification	2017, DRMR 1165-40
Year of notification and S.O. No.	SO 3482 (E) Dated 07-10-2020
Recommended Region / Areas	Zone II (Delhi, Haryana, Jammu & Kashmir, Punjab and Parts Of Rajasthan)
Cultivar descriptor	Plant height : 177-196 cm Maturity : 133-151 days Oil content : 40.1-42.5% 1000 Seed wt.: 3.2-6.6 g
Special Attributes, If any	Suitable for timely sown rainfed conditions
Yield	2200-2600 kg/ha

Indian Mustard: DRMR 2017-15 (Radhika)

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	DRMR 2017-15 (Radhika)
Year of Identification	2020, DRMR 2017-15
Year of notification and S.O. No.	2986 (E), Dated 20-07-2021
Recommended Region / Areas	Late sown irrigated conditions of Zone II (Delhi, Haryana, Jammu & Kashmir, Punjab and Parts Of Rajasthan)
Cultivar descriptor	Plant height : 191-204 cm Maturity : 120-150 days Oil content : 40.0-41.8 % 1000 Seed wt.: 2.8-5.1 g
Special Attributes, If any	Suitable for late sowing under irrigated Conditions, tolerant to high temperature at terminal stage
Yield	1686-1847 kg/ha

Indian Mustard: DRMRIC 16-38 (Brijraj)

Name of the Crop	Indian Mustard (*B. juncea*)
Name of the Cultivar	DRMRIC 16-38 (Brijraj)
Year of Identification	2020, DRMRIC 16-38
Year of notification and S.O. No.	2986 (E), Dated 20-07-2021
Recommended Region / Areas	Zone II (Delhi, Haryana, Jammu & Kashmir, Punjab and Parts Of Rajasthan)
Cultivar descriptor	Plant height : 188-197 cm Maturity : 120-149 days Oil content : 37.6-40.9% 1000 Seed wt.: 2.9-5.0 g
Special Attributes, If any	Suitable for late sowing under irrigated conditions
Yield	1733 kg/ha

Indian Mustard: BPM-11

1	Name of crop	India Mustard (*B. juncea*)
2	Variety	DRMR 2018-19 (BPM-11)
3	Suitable Zone	Zone III (MP,UP,UK and RJ)
4	Notification year	2023
5	Maturity period (Days)	120-125
6	Yield /hectare (kg)	1649-2058
7	Special Characteristics	Late sown irrigated condition, White rust resistant
8	Oil percentages	40-41

Yellow Sarson: NRCYS 05-02

Name of the Crop	Yellow Sarson (*B. campestris* var. *yellow sarson*)
Name of the Cultivar	NRCYS 05-02
Year of Identification	2008, NRCYS 05-02
Year of notification and S.O. No.	454 (E), Dated 11-02-2009
Recommended Region / Areas	Yellow sarson growing areas of the country
Cultivar descriptor	Plant height : 110-120 cm Maturity : 94-181 days Oil content : 38.2-46.5% 1000 Seed wt.: 2.2-6.6 g
Special Attributes, If any	Early maturity, medium height and high oil content
Yield	1239-1715 kg/ha

Commercialization of DRMR hybrid/ varieties (2023-24)

Variety	Name of Private Partners	Date
NRCHB- 506	Trikuta Agri Seeds Pvt. Ltd.	20/09/2023
NRCHB- 101	Trikuta Agri Seeds Pvt. Ltd.	20/09/2023
NRCHB- 506	Ajeet Seeds Pvt. Ltd.	21/09/2023
GIRIRAJ (DRMRIJ-31)	Ajeet Seeds Pvt. Ltd.	21/09/2023
NRCHB- 506	Ganga Kaveri Seeds Pvt. Ltd. New Delhi	04/10/20223
NRCHB- 101	Navrattan Seeds Pvt. Ltd. Sirsa, Haryana	12/10/2023
NRCHB- 506	Delta Agrigenetics Pvt. Ltd.	12/01/2024
DRMRIJ-31 (GIRIRAJ)	Delta Agrigenetics Pvt. Ltd.	12/01/2024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Variety : Groundnut Co 7

Name of the Variety	Groundnut Co 7	
Background	TNAU, Coimbatore (2015)	
Salient Features (in Bullets)	• Spanish Bunch • Resistant to rust	
Benefits/Utility	Pod yield (Kg/ha): 2300 (kharif); 2806 (rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu	
Business and commercial potential	Oil content (%)	50.5-51
	Shelling (%)	71

Variety : Phule Bharti (JL 776)

Name of the Variety	Phule Bharti (JL 776)	
Background	MPKV, Jalgaon (2015)	
Salient Features (in Bullets)	• Spanish Bunch • Resistant to *S. litura* and rust in field condition	
Benefits/Utility	Pod yield (Kg/ha): 2110 (kharif)	
Scalability/ Target market / Market intelligence	Maharashtra and Madhya Pradesh	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	69

Variety : G 2-52

Name of the Variety	G 2-52	
Background	UAS, Dharwad (2015)	
Salient Features (in Bullets)	• Spanish Bunch • Foliar disease resistant	
Benefits/Utility	Pod yield (Kg/ha): 2000-2500 (kharif)	
Scalability/ Target market / Market intelligence	Karnataka	
Business and commercial potential	Oil content (%)	48
	Shelling (%)	71

Variety : GKVK 5

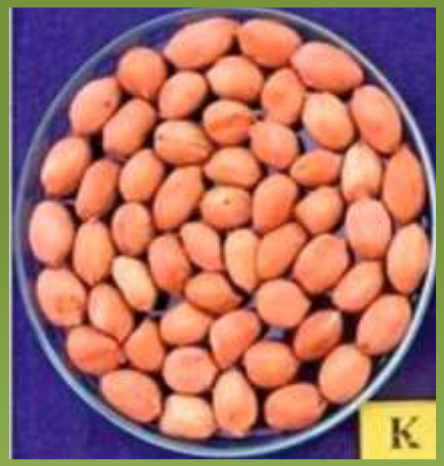
Name of the Variety	GKVK 5	
Background	UAS, GKVK, Bangaluru (2016)	
Salient Features (in Bullets)	• Spanish Bunch • Drought tolerant; moderately resistance to rust and LLS	
Benefits/Utility	Pod yield (Kg/ha): 2500-2800 (Kharif and Summer)	
Scalability/ Target market / Market intelligence	Southern Karnataka	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	74

Variety : ALG -06-320

Name of the Variety	ALG -06-320	
Background	TNAU, Tindivanam (2017)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to rust, LLS and Peanut Bud Necrosis disease (PBND), *S. litura*, leaf miner and thrips	
Benefits/Utility	Pod yield (Kg/ha): 2741 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu and Andhra Pradesh	
Business and commercial potential	Oil content (%)	50.3
	Shelling (%)	70.7

Variety : Kadiri Amaravathi (K 1535)

Name of the Variety	Kadiri Amaravathi (K 1535)	
Background	ANGRAU, Kadiri (2017)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to early and late season drought; tolerant to leaf spot, sucking pests (thrips and jassids)	
Benefits/Utility	Pod yield (Kg/ha): 1600-1800 (Kharif)	
Scalability/ Target market / Market intelligence	Andhra Pradesh	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	65



Variety : VRI 8 (VG 09220)

Name of the Variety	VRI 8 (VG 09220)	
Background	TNAU, Vridhachalam (2017)	
Salient Features (in Bullets)	• Spanish Bunch • Moderately resistant to sucking pest (jassids and thrips), moderately resistant to LLS and rust	
Benefits/Utility	Pod yield (Kg/ha): 2130 (Kharif); 2700 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu	
Business and commercial potential	Oil content (%)	49-50
	Shelling (%)	70

Variety : GJG 32 (ICGV 03043)

Name of the Variety	GJG 32 (ICGV 03043)	
Background	JAU, Junagadh (2018)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to stem rot, color rot and rust	
Benefits/Utility	Pod yield (Kg/ha): 1947 (Kharif)	
Scalability/ Target market / Market intelligence	Tamil Nadu, Andhra Pradesh, Karnataka, southern Maharashtra and Telangana, Gujarat (Area extention)	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	66

Variety : GJG 33 (ICGV 07222)

Name of the Variety	GJG 33 (ICGV 07222)	
Background	JAU, Junagadh (2018)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to collar rot and rust	
Benefits/Utility	Pod yield (Kg/ha): 3064 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu, Andhra Pradesh and Telangana	
Business and commercial potential	Oil content (%)	51
	Shelling (%)	67

Variety : DH-232

Name of the Variety	DH-232	
Background	UAS, Dharwad (2018)	
Salient Features (in Bullets)	• Spanish Bunch • Resistance to Foliar diseases	
Benefits/Utility	Pod yield (Kg/ha): 2500-3000 (Kharif)	
Scalability/ Target market / Market intelligence	Karnataka	
Business and commercial potential	Oil content (%)	46.9
	Shelling (%)	77.4

Variety : DH-245

Name of the Variety	DH-245	
Background	UAS, Dharwad (2018)	
Salient Features (in Bullets)	• Spanish Bunch • Resistance to Foliar diseases	
Benefits/Utility	Pod yield (Kg/ha): 2500-2900 (Kharif)	
Scalability/ Target market / Market intelligence	Karnataka	
Business and commercial potential	Oil content (%)	45.9
	Shelling (%)	73
Social impact of the technology	High oleic acid (>70%)	

Variety : Nitya Haritha (TCGS 1157)

Name of the Variety	Nitya Haritha (TCGS 1157)	
Background	ANGRAU, Tirupati (2018)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerance against late leaf spot, rust and PSND	
Benefits/Utility	Pod yield (Kg/ha): 2657 (Kharif)	
Scalability/ Target market / Market intelligence	Maharashtra and Madhya Pradesh	
Business and commercial potential	Oil content (%)	49
	Shelling (%)	69

Variety : Avtar (ICGV 93468)

Name of the Variety	Avtar (ICGV 93468)	
Background	CSAUA&T, Kanpur (2018)	
Salient Features (in Bullets)	• Spanish Bunch • Early maturity; tolerant to PBND, Fungal diseases, Jassid and pod borer	
Benefits/Utility	Pod yield (Kg/ha): 2400 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Uttar Pradesh	
Business and commercial potential	Oil content (%)	51.1
	Shelling (%)	70.6

Variety : TMV 14

Name of the Variety	TMV 14	
Background	TNAU, Tindivanam (2019)	
Salient Features (in Bullets)	• Spanish Bunch • Early maturity; tolerent to S. litura, thrips, leaf minor; moderately resistance to LLS and rust	
Benefits/Utility	Pod yield (Kg/ha): 2124 (Kharif)	
Scalability/ Target market / Market intelligence	Tamil Nadu	
Business and commercial potential	Oil content (%)	48
	Shelling (%)	70.6

Variety : Phule Chaitanya (Central- KDG 160)

Name of the Variety	Phule Chaitanya (Central- KDG 160)	
Background	MPKV, Digraj (2019)	
Salient Features (in Bullets)	• Spanish Bunch	
Benefits/Utility	Pod yield (Kg/ha): 2184 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu, Telangana and Andhra Pradesh	
Business and commercial potential	Oil content (%)	51.6
	Shelling (%)	66.6

Variety : AK 335 (PDKVG-335)

Name of the Variety	AK 335 (PDKVG-335)	
Background	PDKV, Akola (2019)	
Salient Features (in Bullets)	• Spanish Bunch • Moderately resistance to tikka, color rot, stem rot, jassid, thrips and aphids	
Benefits/Utility	Pod yield (Kg/ha): 2200-2400 (Kharif)	
Scalability/ Target market / Market intelligence	Maharashtra	
Business and commercial potential	Oil content (%)	48-49
	Shelling (%)	68.7

Variety : Phule Unnati (RHRG 6083)

Name of the Variety	Phule Unnati (RHRG 6083)	
Background	MPKV, Rahuri (2019)	
Salient Features (in Bullets)	• Spanish Bunch • Resistance to LLS, stem rot, rust, *S. litura*, and thrips	
Benefits/Utility	Pod yield (Kg/ha): 2854 (Kharif); 3990 (Rabi-Summer)	
Scalability/ Target market / Market intelligence	Maharashtra	
Business and commercial potential	Oil content (%)	52
	Shelling (%)	68

Variety : Phule Dhani (JL 1085)

Name of the Variety	Phule Dhani (JL 1085)	
Background	MPKV, Rahuri (2019)	
Salient Features (in Bullets)	• Spanish Bunch • Resistance to LLS and rust	
Benefits/Utility	Pod yield (Kg/ha): 3333 (Kharif)	
Scalability/ Target market / Market intelligence	Tamil Nadu, Andhra Pradesh and Karnataka	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	68

Variety : Gujarat Groundnut-34 (GG 34)

Name of the Variety	Gujarat Groundnut-34 (GG 34) (AG-2012-06)	
Background	AAU, Anand (2019)	
Salient Features (in Bullets)	• Spanish Bunch	
Benefits/Utility	Pod yield (Kg/ha): 3715 (Summer)	
Scalability/ Target market / Market intelligence	Gujarat	
Business and commercial potential	Oil content (%)	52.8
	Shelling (%)	67.9

Variety : Dheeraj (TCGS 1073)

Name of the Variety	Dheeraj (TCGS 1073)	
Background	ANGRAU, Tirupati (2019)	
Salient Features (in Bullets)	• Spanish Bunch • Possesses heat tolerance and high water use efficiency	
Benefits/Utility	Pod yield (Kg/ha): 2547 (Kharif); 3690 (Rabi)	
Scalability/ Target market / Market intelligence	Andhra Pradesh	
Business and commercial potential	Oil content (%)	48-49
	Shelling (%)	77

Variety : BSR 2 (BSG 0912)

Name of the Variety	BSR 2 (BSG 0912)	
Background	TNAU, Bhavanisagar (2019)	
Salient Features (in Bullets)	• Spanish Bunch • Moderately resistance to rust, LLS, jassid, thrips and aphids	
Benefits/Utility	Pod yield (Kg/ha): 2222 (Kharif); 2360 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu	
Business and commercial potential	Oil content (%)	45
	Shelling (%)	70.2

Variety : Central-Pragati (TCGS 894)

Name of the Variety	Central-Pragati (TCGS 894)	
Background	ANGRAU, Tirupati (2019)	
Salient Features (in Bullets)	• Spanish Bunch	
Benefits/Utility	Pod yield (Kg/ha): 2816 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu, Telangana and Andhra Pradesh	
Business and commercial potential	Oil content (%)	48
	Shelling (%)	70

Variety : Dh 256

Name of the Variety	Dh 256	
Background	UAS, Dharwad (2019)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to mid season drought, *S. litura*, thrips and leaf miner and leaf hopper	
Benefits/Utility	Pod yield (Kg/ha): 3258 (Kharif)	
Scalability/ Target market / Market intelligence	Tamil Nadu, Andhra Pradesh, Karnataka and Telangana	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	68

Variety : Pratap Mungphli 3 (UG 116)

Name of the Variety	Pratap Mungphli 3 (UG 116)	
Background	MPAUT, Udaipur (2020)	
Salient Features (in Bullets)	• Spanish Bunch • Moderately tolerant to Early Leaf Spot (ELS), Late Leaf Spot (LLS), rust, collar rot and dry root rot; moderately resistant to *Spodoptera litura*, leaf miner, defoliators, jassids, thrips and leafhopper	
Benefits/Utility	Pod yield (Kg/ha): 3388 (Kharif and Summer)	
Scalability/ Target market / Market intelligence	Rajasthan	
Business and commercial potential	Oil content (%)	47
	Shelling (%)	70

Variety : Jagtial Palli 1 (JGC 2141)

Name of the Variety	Jagtial Palli 1 (JGC 2141)	
Background	PJTSAT, Jagtial (2020)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to early season drought; resistant to Leaf spots and rust diseases; tolerant to Sucking pests such as Thrips and Jassids	
Benefits/Utility	Pod yield (Kg/ha): 3330-3500 (Kharif and Summer)	
Scalability/ Target market / Market intelligence	Telangana	
Business and commercial potential	Oil content (%)	51.5
	Shelling (%)	64

Variety : K 1719 (Kadiri Chithravathi)

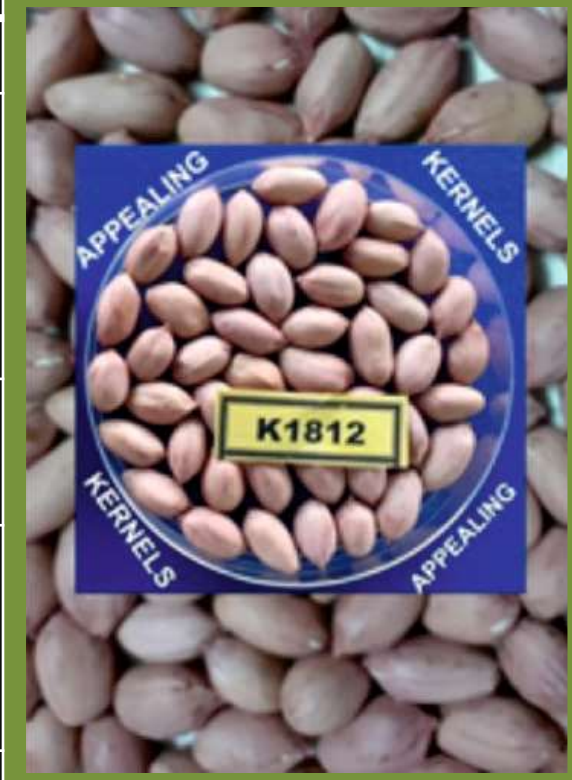
Name of the Variety	K 1719 (Kadiri Chithravathi)	
Background	ANGRAU, Kadiri (2021)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to collar rot, PBND and thrips	
Benefits/Utility	Pod yield (Kg/ha): 3092 (Rabi-Summer)	
Scalability/ Target market / Market intelligence	Andhra Pradesh, Telangana, and Tamil Nadu	
Business and commercial potential	Oil content (%)	49
	Shelling (%)	70

Variety : DH 257

Name of the Variety	DH 257	
Background	UAS, Dharwad (2021)	
Salient Features (in Bullets)	• Spanish Bunch • Drought tolerant	
Benefits/Utility	Pod yield (Kg/ha): 3397 (Rabi-Summer)	
Scalability/ Target market / Market intelligence	Karnataka and Maharashtra	
Business and commercial potential	Oil content (%)	48
	Shelling (%)	72

Variety : K 1812 (Kadiri Lepakshi)

Name of the Variety	K 1812 (Kadiri Lepakshi)	
Background	ANGRAU, Kadiri (2021)	
Salient Features (in Bullets)	• Spanish Bunch • Drought tolerant; multiple Disease & Pests Resistant	
Benefits/Utility	Pod yield (Kg/ha): 3514 (Kharif)	
Scalability/ Target market / Market intelligence	AP, Telangana, Karnataka and Tamilnadu	
Business and commercial potential	Oil content (%)	51
	Shelling (%)	70



Variety : J 87 (Gujarat Groundnut 36)

Name of the Variety	J 87 (Gujarat Groundnut 36)	
Background	JAU, Junagadh (2021)	
Salient Features (in Bullets)	• Spanish Bunch • Bold kernel (HKW 63g)	
Benefits/Utility	Pod yield (Kg/ha): 4165 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Punjab and Uttar Pradesh	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	70

Variety : Gujarat Groundnut 35 (Sorath Gold)

Name of the Variety	Gujarat Groundnut 35 (Sorath Gold)	
Background	JAU, Junagadh (2021)	
Salient Features (in Bullets)	• Spanish Bunch	
Benefits/Utility	Pod yield (Kg/ha): 3177 (Kharif)	
Scalability/ Target market / Market intelligence	Gujarat	
Business and commercial potential	Oil content (%)	49.8
	Shelling (%)	71.4

Variety : Kalinga Groundnut 101

Name of the Varietyc	Kalinga Groundnut 101	
Background	OUAT, Bhubaneshwar (2021)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to late leaf spot and rust	
Benefits/Utility	Pod yield (Kg/ha): 3179 (Rabi-Summer)	
Scalability/ Target market / Market intelligence	Odisha	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	72

Variety : TAG-73 (TAG 14-73)

Name of the Variety	TAG-73 (TAG 14-73)	
Background	PDKV, Akola & BARC, Mumbai (2021)	
Salient Features (in Bullets)	• Spanish Bunch • Moderate resistance to major diseases (Tikka, Collar rot and Stem rot) and pests (Jassid, Thrips & Aphids).	
Benefits/Utility	Pod yield (Kg/ha): 2500-2800 (Summer)	
Scalability/ Target market / Market intelligence	Vidarbha region of Maharashtra	
Business and commercial potential	Oil content (%)	49
	Shelling (%)	72.6

Variety : VRI 9 (VG 13163)

Name of the Variety	VRI 9 (VG 13163)	
Background	TNAU, Vridhhachalam (2022)	
Salient Features (in Bullets)	• Spanish Bunch • Exhibited moderate resistance reaction to LLS and Rust	
Benefits/Utility	Pod yield (Kg/ha): 2526 (Kharif); 2921 (Rabi-summer)	
Scalability/ Target market / Market intelligence	Tamil Nadu	
Business and commercial potential	Oil content (%)	47-49
	Shelling (%)	70-72

Variety : GG 40 (ICGV 16668)

Name of the Variety	GG 40 (ICGV 16668)	
Background	JAU, Junagadh (2022)	
Salient Features (in Bullets)	• Spanish Bunch	
Benefits/Utility	Pod yield (Kg/ha): 3321 (Kharif)	
Scalability/ Target market / Market intelligence	Rajasthan, Gujarat, Karnataka, Tamil Nadu, Andhra Pradesh and Telagana	
Business and commercial potential	Oil content (%)	51
	Shelling (%)	63
Social impact of the technology	Recorded 78.4% oleic acid and 3.56% linoleic acid	

Variety : Visishta (TCGS 1694)

Name of the Variety	Visishta (TCGS 1694)	
Background	ANGRAU, Tirupati (2022)	
Salient Features (in Bullets)	• Spanish Bunch • Tolerant to foliar diseases viz., early leaf spot, late leaf spot and rust diseases;	
Benefits/Utility	Pod yield (Kg/ha): 2489 (kharif); 2495 (rabi)	
Scalability/ Target market / Market intelligence	Andhra Pradesh	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	72-75

Variety : Improved JL 24 (DBG 3)

Name of the Variety	Improved JL 24 (DBG 3)	
Background	UAS, Dharwad (2022)	
Salient Features (in Bullets)	• Spanish Bunch • Resistant to late leaf spot; Susceptible to late leaf spot	
Benefits/Utility	Pod yield (Kg/ha): 2736 (Kharif)	
Scalability/ Target market / Market intelligence	Karnataka	
Business and commercial potential	Oil content (%)	53.8
	Shelling (%)	75-76

Variety : GG 37 (Sorath Gaurav)

Name of the Variety	GG 37 (Sorath Gaurav)	
Background	JAU, Junagadh (2022)	
Salient Features (in Bullets)	• Spanish Bunch	
Benefits/Utility	Pod yield (Kg/ha): 3218 (Summer)	
Scalability/ Target market / Market intelligence	Gujarat	
Business and commercial potential	Oil content (%)	48.9
	Shelling (%)	73

Variety : GG 38 (Sorath Navin)

Name of the Variety	GG 38 (Sorath Navin)	
Background	JAU, Junagadh (2022)	
Salient Features (in Bullets)	• Spanish Bunch	
Benefits/Utility	Pod yield (Kg/ha): 2966 (Kharif)	
Scalability/ Target market / Market intelligence	Gujarat	
Business and commercial potential	Oil content (%)	48.9
	Shelling (%)	72.4

Variety : Super TMV 2 (DBG 4)

Name of the Variety	Super TMV 2 (DBG 4)	
Background	UAS, Dharwad (2022)	
Salient Features (in Bullets)	• Spanish Bunch • Resistant to late leaf spot	
Benefits/Utility	Pod yield (Kg/ha): 2440 (Summer)	
Scalability/ Target market / Market intelligence	Karnataka	
Business and commercial potential	Oil content (%)	-
	Shelling (%)	78

Variety : VRI 10 (VG 17008)

Name of the Variety	VRI 10 (VG 17008)	
Background	TNAU, Vridhhachalam (2023)	
Salient Features (in Bullets)	• Spanish Bunch • Moderate resistance to late leaf spot, rust diseases and moderately resistant to sucking pests and defoliators • Early maturity	
Benefits/Utility	Pod yield (Kg/ha): 2535 (kharif); 2448 (rabi)	
Scalability/ Target market / Market intelligence	Tamil nadu	
Business and commercial potential	Oil content (%)	46-48
	Shelling (%)	70-72

Variety : Raj Mungfali-2 (RG 578)

Name of the Variety	Raj Mungfali-2 (RG 578)	
Background	SKRAU, Durgapura (2015)	
Salient Features (in Bullets)	• Virginia Bunch • Resistant to LLS, dry root rot,ELS and rust ; tolerant to S. litura, thrips, jassids and leaf miner	
Benefits/Utility	Pod yield (Kg/ha): 1480 (Kharif)	
Scalability/ Target market / Market intelligence	Odisha, WB and Manipur	
Business and commercial potential	Oil content (%)	46
	Shelling (%)	72

Variety : Birsa Groundnut 4 (BAU 25)

Name of the Variety	Birsa Groundnut 4 (BAU 25)	
Background	BAU, Kanke (2015)	
Salient Features (in Bullets)	• Virginia Bunch • Large seeded; resistant to LLS	
Benefits/Utility	Pod yield (Kg/ha): 2000-2200 (Kharif)	
Scalability/ Target market / Market intelligence	Jharkhand	
Business and commercial potential	Oil content (%)	50.8
	Shelling (%)	72

Variety : Raj Mungfali 3 (RG 559-3)

Name of the Variety	Raj Mungfali 3 (RG 559-3)	
Background	SKNAU, Durgapura (2016)	
Salient Features (in Bullets)	• Virginia Bunch • Large seeded; tolerant to *S.litura*, leafminer and thrips	
Benefits/Utility	Pod yield (Kg/ha): 3173 (Kharif)	
Scalability/ Target market / Market intelligence	Rajasthan, UP and Punjab	
Business and commercial potential	Oil content (%)	49
	Shelling (%)	69

Variety : Phule Warna (KDG 128)

Name of the Variety	Phule Warna (KDG 128)	
Background	MPKV, Digraj (2016)	
Salient Features (in Bullets)	• Virginia Bunch • Moderately resistance to rust and leaf spot	
Benefits/Utility	Pod yield (Kg/ha): 2425 (Kharif)	
Scalability/ Target market / Market intelligence	Tamil Nadu, Andhra Pradesh, Karnataka,southern Maharashtra Gujarat and Rajasthan	
Business and commercial potential	Oil content (%)	50.9
	Shelling (%)	65

Variety : Phule Morna (KDG 123)

Name of the Variety	Phule Morna (KDG 123)	
Background	MPKV, Digraj (2016)	
Salient Features (in Bullets)	• Virginia Bunch • Moderately resistance to rust and leaf spot	
Benefits/Utility	Pod yield (Kg/ha): 2212 (Kharif)	
Scalability/ Target market / Market intelligence	Gujarat, Rajasthan Odisha, WB, Jharkhand, Manipur, Tamil Nadu, AP,Karnataka and Southern Maharashtra	
Business and commercial potential	Oil content (%)	44
	Shelling (%)	70

Variety : Konkan Bhuratna (RTNG-29)

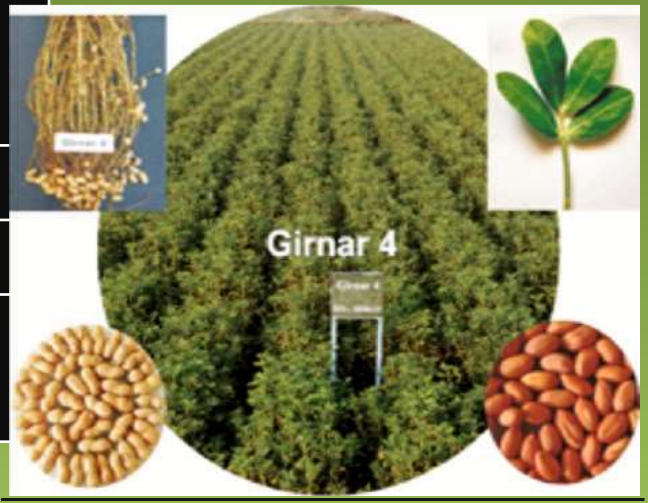
Name of the Variety	Konkan Bhuratna (RTNG-29)	
Background	DBSKKV, Dapoli (2019)	
Salient Features (in Bullets)	• Virginia Bunch • Resistance toELS, LLS, rust, PBND, thrips, jassids and leaf miner	
Benefits/Utility	Pod yield (Kg/ha): 2500-3000 (Kharif)	
Scalability/ Target market / Market intelligence	Maharashtra	
Business and commercial potential	Oil content (%)	50
	Shelling (%)	74

Variety : Gujarat Groundnut HPS 2 (GG HPS 2)

Name of the Variety	Gujarat Groundnut HPS 2 (GG HPS 2)	
Background	JAU, Junagadh (2019)	
Salient Features (in Bullets)	• Virginia Bunch • Large seeded	
Benefits/Utility	Pod yield (Kg/ha): 2835 (Kharif)	
Scalability/ Target market / Market intelligence	Gujarat	
Business and commercial potential	Oil content (%)	48.8
	Shelling (%)	68.6

Variety : Girnar 4 (ICGV 15083)

Name of the Variety	Girnar 4 (ICGV 15083)	
Background	ICAR-DGR, Junagadh (2020)	
Salient Features (in Bullets)	• Virginia Bunch • Tolerant to Late Leaf spot, Rust, Stem rot and Peanut Bud Necrosis Disease, Leaf hopper, Leaf miner, thrips and *Spodoptera litura*	
Benefits/Utility	Pod yield (Kg/ha): 3218 (Kharif)	
Scalability/ Target market / Market intelligence	Rajasthan, Gujarat, Karnataka, Tamil Nadu and Andhra Pradesh	
Business and commercial potential	Oil content (%)	53
	Shelling (%)	67
Social impact of the technology	Recorded 78.5% oleic acid and 4.8% linoleic acid	



Variety : Girnar 5 (ICGV 15090)

Name of the Variety	Girnar 5 (ICGV 15090)	
Background	ICAR-DGR, Junagadh (2020)	
Salient Features (in Bullets)	• Virginia Bunch • Tolerant to Late Leaf spot, Rust, Stem rot and Collar rot, Leaf hopper, Leaf miner, thrips and *Spodoptera litura*	
Benefits/Utility	Pod yield (Kg/ha): 3124 (Kharif)	
Scalability/ Target market / Market intelligence	Rajasthan, Gujarat, Karnataka, Tamil Nadu and Andhra Pradesh	
Business and commercial potential	Oil content (%)	53
	Shelling (%)	67
Social impact of the technology	Recorded 78.4% oleic acid and 4.6% linoleic acid	

Variety : Groundnut 23 (Sorath Kiran)

Name of the Variety	Gujarat Groundnut 23 (Sorath Kiran)	
Background	JAU, Junagadh (2021)	
Salient Features (in Bullets)	• Virginia Bunch	
Benefits/Utility	Pod yield (Kg/ha): 2722 (Kharif)	
Scalability/ Target market / Market intelligence	Gujarat	
Business and commercial potential	Oil content (%)	49.7
	Shelling (%)	69.4

Variety : Raj Mungfali 4 (RG 638)

Name of the Variety	Raj Mungfali 4 (RG 638)	
Background	SKNAU, Durgapura (2022)	
Salient Features (in Bullets)	• Virginia Bunch	
Benefits/Utility	Pod yield (Kg/ha): 3698 (Kharif)	
Scalability/ Target market / Market intelligence	Rajasthan, UP and Punjab	
Business and commercial potential	Oil content (%)	49
	Shelling (%)	74

Variety : GJG 18 (JSP 49)

Name of the Variety	GJG 18 (JSP 49)	
Background	JAU, Junagadh (2015)	
Salient Features (in Bullets)	• Virginia Runner • Moderately resistant to PBND and PSND	
Benefits/Utility	Pod yield (Kg/ha): 1450 (Kharif)	
Scalability/ Target market / Market intelligence	Odisha, WB, Jharkhand and Manipur	
Business and commercial potential	Oil content (%)	48
	Shelling (%)	69

Variety : GJG 19 (JSP 51)

Name of the Variety	GJG 19 (JSP 51)	
Background	JAU, Junagadh (2016)	
Salient Features (in Bullets)	• Virginia Runner • Tolerant to stem rot, dry root rot and rust as compared to check (KDG 123)	
Benefits/Utility	Pod yield (Kg/ha): 1876 (Kharif)	
Scalability/ Target market / Market intelligence	Odisha, West Bengal, Jharkhand and Manipur	
Business and commercial potential	Oil content (%)	47
	Shelling (%)	69

Variety : Gujarat Groundnut 41 (Padma)

Name of the Variety	Gujarat Groundnut 41 (Padma)	
Background	JAU, Junagadh (2020)	
Salient Features (in Bullets)	• Virginia Runner	
Benefits/Utility	Pod yield (Kg/ha): 2722 (Kharif)	
Scalability/ Target market / Market intelligence	Gujarat	
Business and commercial potential	Oil content (%)	51.4
	Shelling (%)	74

Linseed Value added products

BVDU, Pune, AICRP-Linseed

Roasted and Salted Flaxseed

Salient Features:

- Natural source of important micronutrients such as calcium, magnesium and potassium etc. and lignan (phytoestrogen).
- 2 spoons-full of FLAXSEEDS provides 3-5 g of Omega 3 fatty acid (Alpha Linolenic Acid)

FSSAI Lic. No. 11519035000624

Contact details:

- AICRP-Linseed Value Addition Centre, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune-411043.
  E-mail: anand.zanwar@bharatividyapeeth.edu

Product cost:

- Rs. 40.00/100 gm
- Bulk price: 350.00/kg
- Packing, forwarding and taxes at actual

Fibre and Lignan Rich Hull Powder

Salient Features:

- Defatted (mechanically pressed) hull fraction of flaxseed mainly containing lignan and dietary fibre
- Highly concentrated form of flaxseed to supplement lignan and dietary fibre

Nutritive value:

- Dietary fibre: 35-40%
- Lignan: upto 1%
- Protein: 15-20%

FSSAI Lic. No. 11519035000624

Product cost:

- Rs. 50.00/100 grams pack
- Minimum order quantity: 25 packs
- Packing, forwarding and taxes at actual

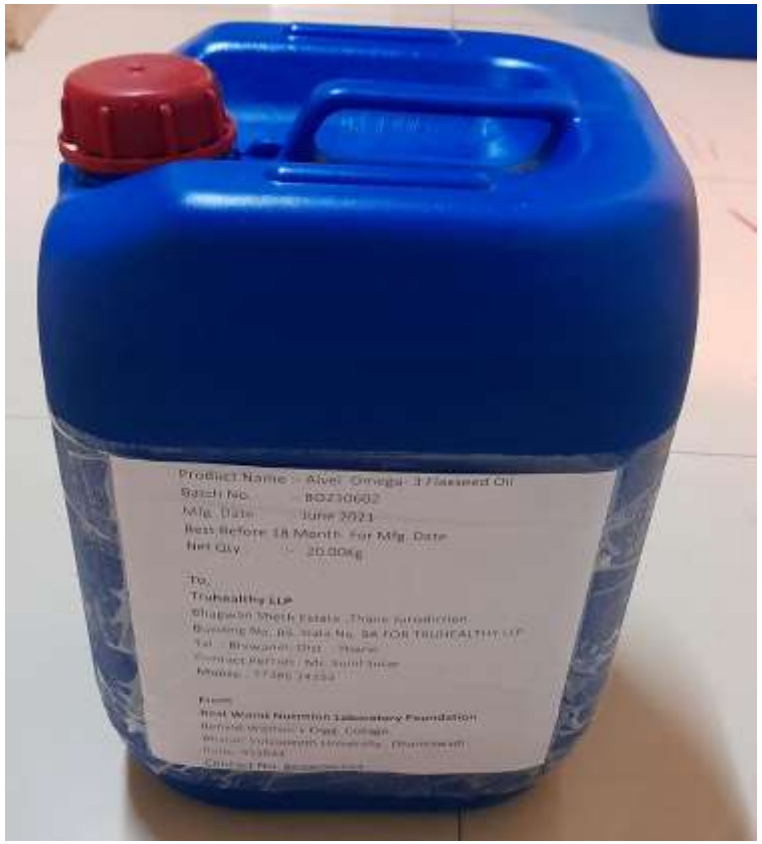
Contact details:

- AICRP-Linseed Value Addition Centre, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune-411043. E-mail: anand.zanwar@bharatividyapeeth.edu

Flaxseed oil

Salient Features:

- Flaxseed oil is a virgin, cold press oil extracted and sealed under nitrogen to ensure purity and avoid rancidity
- Oil can be used for salad dressings, chapattis, dal, rice, ghee, mayonnaise, sauce, curds, milkshakes, honey, curd and yoghurt etc.
- **Nutritive values:**
  - Omega-3 FA: 50-55 %
  - Vitamin E: 1%



FSSAI Lic. No. 1151603500506

Product cost:

- Rs. 125.00/100 ml
- Bulk price: 505.00/kg
- Minimum order quantity (oil bottle): 50 nos.
- Minimum order quantity (bulk): 200 kg
- Packing, forwarding and taxes at actual

Contact details:

- AICRP-Linseed Value Addition Centre, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune-411043. E-mail: anand.zanwar@bharatividyapeeth.edu

Velmega Softgel Capsules

Salient Features:

- VELMEGA Softgel is easy to consume, easy to carry linseed oil in soft gel form, and has all the goodness of a vegetarian omega-3 oil
- With added vitamin E, it is protected from oxidation with in the soft gel and also ensures better utility in human body
- Application/Dosage: 1 to 2 capsules per day

Ayurvedic Lic. No. GA/505

Product cost:

- Rs. 600.00/90 capsule bottle
- Rs. 235.00/30 blister capsule pack
- Minimum order quantity: 25 packs
- Packing, forwarding and taxes at actual

Contact details:

- AICRP-Linseed Value Addition Centre, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune-411043. E-mail: anand.zanwar@bharatividyapeeth.edu

Flaxseed Oil Emulsion

Salient Features:

- Water soluble form of omega-3 fatty acid enriched with multivitamins to fulfill the needs of growing children
- Can be used in fortification of other food products such as chocolates, sweets, jam, bakery and dairy products
- **Nutritive value:**
  - Fat: 30 %
  - Omega-3 FA: 13-15 %

FSSAI Lic. No. 1151603500506

Product cost:

- Rs. 155.00/100 ml bottle
- Minimum order quantity: 25 packs
- Packing, forwarding and taxes at actual

Contact details:

- AICRP-Linseed Value Addition Centre, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune-411043. E-mail: anand.zanwar@bharatividyapeeth.edu

Omega-3 Chocolates

Salient Features:

- Omega-3 chocolate is enriched with omega-3 fatty acid, tasty and delicious
- 5-10 Chocolates/pack and customized pack sizes

Nutritive value:

- Fat: 20%
- Protein: 40%
- Omega-3 FA: 1-2%

FSSAI loan Lic. No. 21521181000736

Contact details:

- AICRP-Linseed Value Addition Centre, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune-411043. E-mail: anand.zanwar@bharatividyapeeth.edu

Product cost:

- Rs. 70.00/10 piece pack
- Minimum order quantity: 50 packs
- Packing, forwarding and taxes at actual

Omega-3-rich Eggs

Salient Features:

- Layer chicks fed on omega-3 enriched feed mix (EFM) lay eggs with over 200±20% mg of omega-3 (ALA+DHA) per egg
- Eggs retain all the goodness of regular egg, good amount of protein and vitamins
- 5 part of EFM need to be mixed with 95 parts of regular poultry feed and the mixture to be fed to layer birds to produce omega-3 rich eggs

FSSAI Lic. No. 11517035001012

Product cost:

- Rs. 120.00/kg (for feed)
- Minimum order quantity: 1 tone
- Packing, forwarding and taxes at actual

Contact details:

- AICRP-Linseed Value Addition Centre, Interactive Research School for Health Affairs, Bharati Vidyapeeth (Deemed to be University), Pune-411043. E-mail: anand.zanwar@bharatividyapeeth.edu


Flaxseed Oil


Fibre and Lignan Rich
Hull Powder


ALVEL
OMEGA-3
CHOCOLATE


ALVEL
PREMIUM
flaxseed
OIL
with Antioxidants

Thank you


Flax Seed Oil Capsules 1000 mg
VELMEGA-1000


Alvel Egg
PROTEIN
OMEGA-3