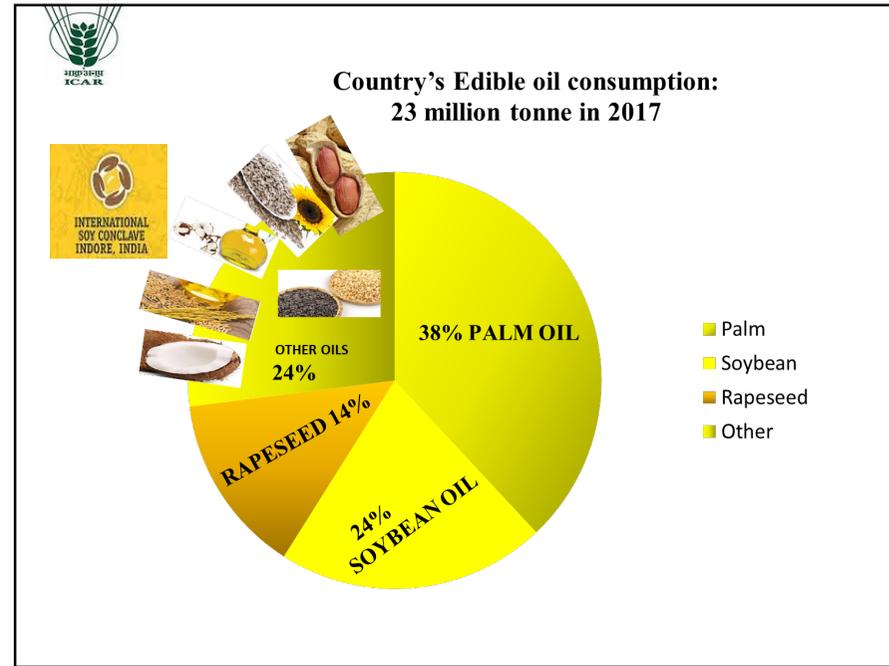


Soybean oils vs other vegetable oils with special reference to segment - specific soybean for the industry



FOR A FIT LIFESTYLE	Fitness : calorie intake and physical activity. 30g of any oil per day does not necessarily keep one fit. Overall dietary pattern
CONTAINS NATURAL ANTIOXIDANTS THAT BOOSTS METABOLISM	Antioxidants don't boost metabolism. Antioxidants prevent the free radical induced oxidative damage.
ANTI-AGING PROPERTIES	not having adequate scientific evidence
REDUCES CHOLESTEROL IN 30 DAYS	Besides dietary source of cholesterol, liver also synthesizes cholesterol.
PROTECTION AGAINST CANCER, HEART DISEASES, DEGENERATIVE NERVE DISEASES, ALZHEIMER'S DISEASES, VIRAL /FUNGAL INFECTIONS, STRESS	NON COMMUNICABLE LIFESTYLE DISEASES

Bench marks determining the quality of vegetable oils.....



Ratio of omega-6 to omega-3 fatty acid
According to WHO 2003* /ICMR:
THIS RATIO SHOULD FALL BETWEEN
5:1 to 10:1 {closest to ratio found in
human cell membrane}

Oxidative stability (Ratio of
Monounsaturated to polyunsaturated
fatty acid, natural antioxidants)

* WHO (2003) Diet, nutrition, and the prevention of chronic diseases. WHO technical report. Series 916

COMMON FATTY ACIDS in DIFFERENT VEGETABLE OILS



Capric acid	C 10:0
Lauric Acid	C12:0
Myristic Acid	C14:0
Palmitic Acid	C16:0
Stearic acid	C18:0
Oleic Acid	C18:1
LINOLEIC ACID (omega 6)	C18:2
α LINOLENIC ACID (omega 3)	C18:3

FATTY ACIDS PROFILE OF IMPORTANT VEGETABLE OILS IN THE COUNTRY.....

Oil	C12:0	C14:0	C16:0	C18:0	C18:1	C18:2	C18:3
COCONUT	47	18	9	3	6	2	-
OLIVE			13	3	71	10	1
PALM			45	4	40	10	
GROUNDNUT			11	2	48	32	1
RICE BRAN			15	2	43	39	1
SESAME			9	4	41	45	-
CORN			10	2	28	58	1
SAFFLOWER			7	2	13	75	-
SUNFLOWER			7	5	22	62	-
SOYBEAN			10	4	24	53	7
CANOLA			4	2	60	22	10
MUSTARD *			2	2	60	14	10
FLAXSEED			3	7	21	16	53

SOY OIL POSSESSES THE MOST IDEAL ω -6/ ω -3 as per the WHO recommendation.....

OILS	C18:2 (ω -6)	C18:3 (ω -3)	ω -6/ ω -3
SOYBEAN ★	53	7-9	6-7 ★
GROUNDNUT	32	1.3	25
SUNFLOWER	68-70	<0.5	ω-6 only
MUSTARD	15	10	1.5
RICE BRAN	39.0	1.1	38.0
PALM	10	-	ω-6 only
OLIVE	10.0	<0.1	100



ω 6: ω 3 ratio in various populations

Population	ω 6: ω 3	Reference
Palaeolithic	0.97	Eaton <i>et al</i> (1998)
Greece prior to 1960	1.00–2.00	Simopoulos (1999)
USA	16.74	Eaton <i>et a</i> (1998)
UK & Northern Europe	15.00	Sanders (2000)
Japan	4.00	Sugano and Hirahana (2000)
India rural	5.0–6.1	Pella <i>et al</i> (2003)
India urban	38–50	Pella <i>et al</i> (2003)



**One g of Fat = 9.0 calories;
25-35% of the Energy should
come from**

**CHRONIC ENERGY DEFICINECY IN
RURAL POOR**
RURAL POOR : 12 g /person
Upper Middle Class: 50 g/person

SKEWED PER CAPITA CONSUMPTION OF OIL



**Oxidative stability of the
vegetable oils**

Oil	C18:1 (M)	C18:2 (ω6)	C18:3 (ω3)	M:P
Olive	71	10	1	6.4
Palm	40	10	----	4.0
Goroundnut	45	32		1.3
Rice Bran	43	39	1	1.1
Sesame	41	45	-	0.9
Safflower	13	75	-	0.2
Sunflower	22	62	-	0.3
Soybean★	24	53	7	0.4★
Canola	60	22	10	2.0
Mustard	10	15	14	0.3
Flaxseed	21	16	53	0.3



INTERNATIONAL SOY CONCLAVE
INDORE, INDIA

HIGH OLEIC ACID OILSEEDs



SWEEKAR
ADVANCED
High Oleic Sunflower Oil

near60% **NON TRANSGENIC APPROACHES.....** 35% **OLEIC ACID**



23%

OLEIC ACID

Thursday, October 11, 2018

A Presentation by Dr Vineet Kumar



HIGH OLEIC ACID soybean

- ❑ **OXIDATIVELY STABLE OIL**
- ❑ **OBVIATES THE NEED FOR PARTIAL HYDROGENATION OF OIL**
- ❑ **FOR BETTER SHELF LIFE OF SOY FORTIFIED PRODUCTS**
- ❑ **DECREASES : LDL - the "BAD CHOLESTEROL"**



NRC 147 (IC 210): 90 days



NRC106: 92 days



Certificate Plant Germplasm Registration

It is certified that germplasm NRC 106 & IC 210 of soybean (INGR 10052, 10053) developed by

Vineet Kumar, Anita 'rani & SM Husain
Directorate of Soybean Research, Khandwa Road, Indore
has been registered by Plant Germplasm Registration Committee (PGRC) of Indian Council of Agricultural Research on May 18, 2010

Rajendra Member-Secretary PGRC
V. K. Singh Chairman PGRC & DDG (CS), ICAR



ITC Limited

Thursday, October 11, 2018 A Presentation by Dr Vineet Kumar

NRC 147: Soybean variety with oleic acid 42%



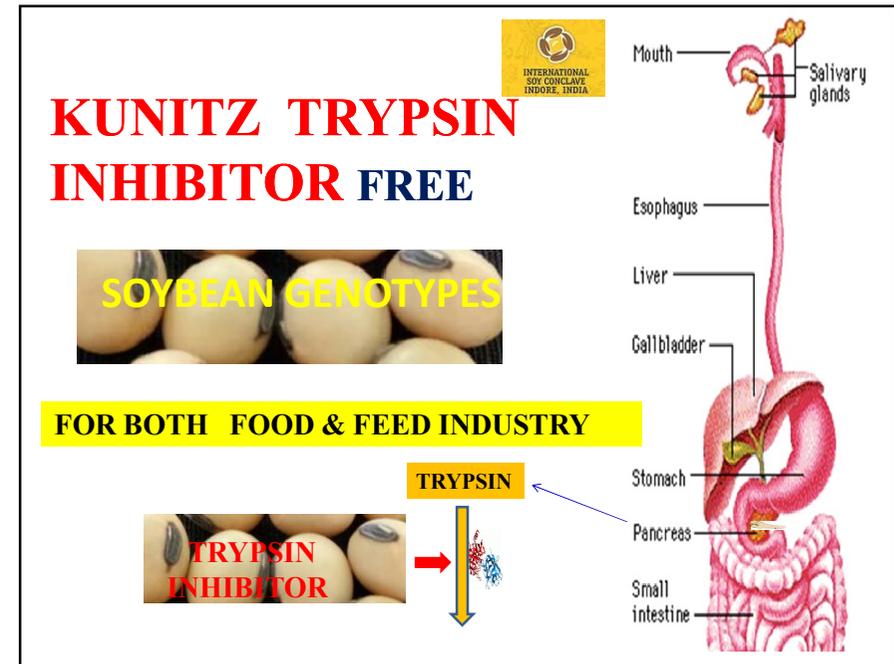
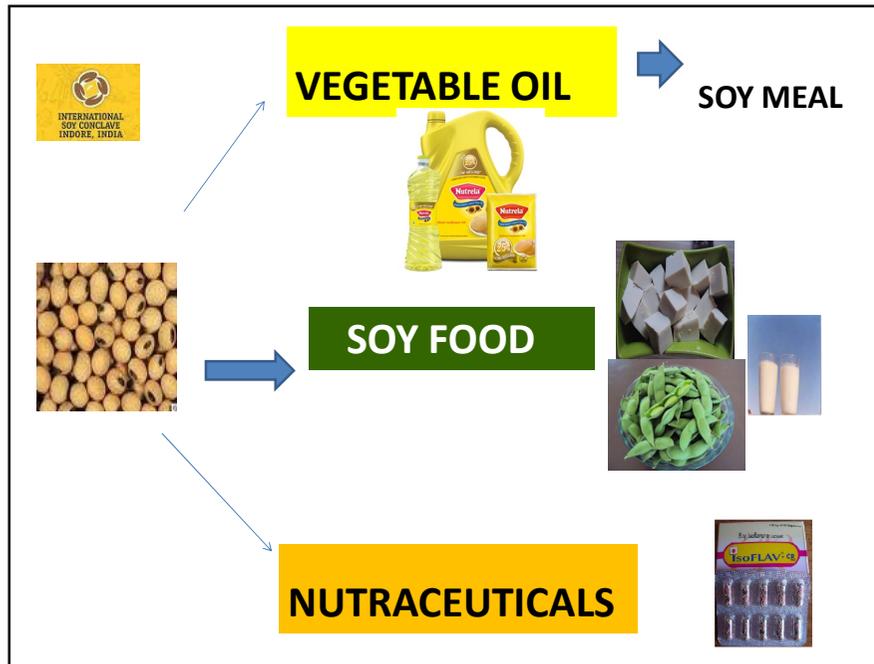
NRC 141 : 60% OLEIC ACID



Improving Oxidative stability and Maintaining desirable **omega-6/omega-3 ratio in HIGH OLEIC LINES (60% oleic acid)**.....



FATTY ACID	Regular Soybean	High Oleic soybean
C16:0	12.5	10.3
C18:0	4.05	2.5
C18:1 (M)	23.0	60.0
C18:2 (P) omega 6	52.40	21.8
C18:3 (P) omega 3	6.5	4.2
Omega 6/omega3	8.06	5.2
M/P	0.40	2.3



WHY KUNITZ TRYPSIN INHIBITOR FREE SOYBEAN in INDIA ?

● GRINDING WITH WHEAT (1:9) FOR PREPARING *Chapati* FLOUR. BOILING SOYBEAN SEEDS FOR 20 min. FOLLOWED BY DRYING FOR MAX. INACTIVATION OF KTI (prior to grinding)



SOY FORTIFIED CHAPATI FOR NUTRITIONAL SECURITY



STRINGENT REQUIREMENTS FOR EXPORT:

Soy products	TI content (mg/g)
Toasted soymeal	5-8 mg
Toasted soy flour	5-8 mg
Soy protein concentrate	less than 4 mg
Soy nuggets	less than 1.25 mg



Heat treatment accounts 25% of energy cost to soy processing

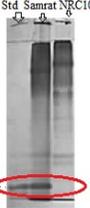
KUNITZ TRYPSIN INHIBITOR FREE SOYBEAN (Samrat xPI542044)

NON-EXCLUSIVE LICENCE FOR 5 YEARS given to

NRC101



std. Samrat NRC101



Kunitz trypsin inhibitor band

NRC102



std. Samrat NRC102



Kunitz trypsin inhibitor band

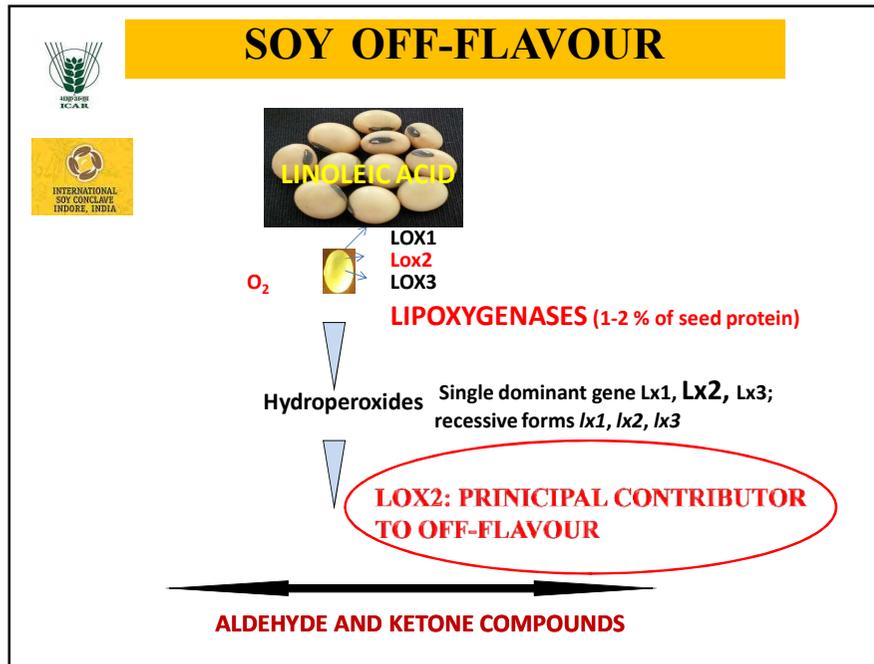
Early Maturity genotypes
Attain maturity 85-90 days
Yield potential equivalent to Samrat 2.0 tonne/ha





KUNITZ TRYPSIN INHIBITOR FREE SOYBEAN RELEASED IN CENTRAL INDIA





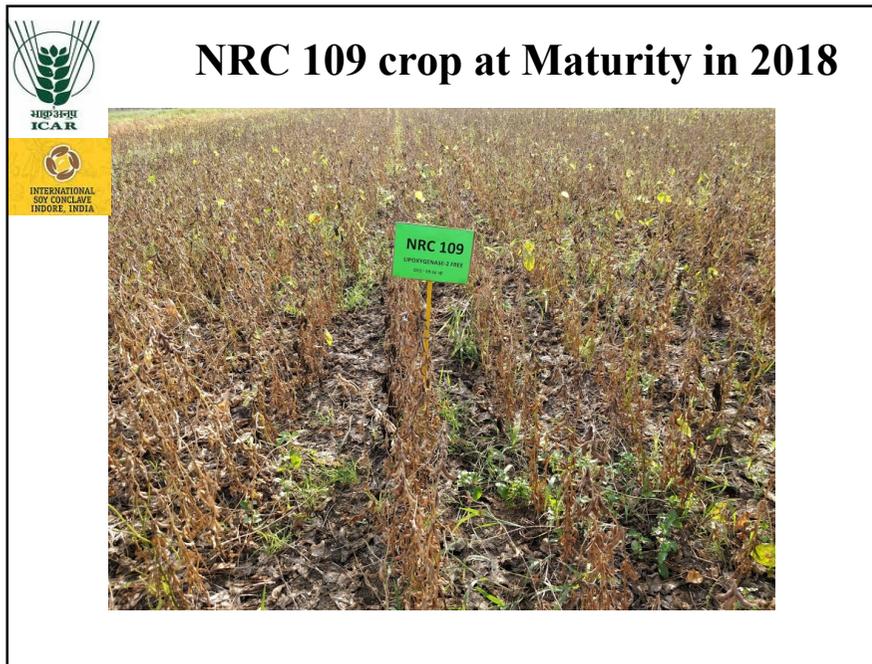
LIPOXYGENASE-2 FREE SOYBEAN
NRC109 :Maturity: 90 day 100 sw : 14 g

LOX-2 FREE
NRC109

NRC109
LIPOXYGENASE 2 FREE
DOB: 03.07.2016

M/s SONIC BIOCHEM
M/s NATURE BIOFOODS

SONIC BIOCHEM



NRC 142: free from Lipoxygenase-2 & Kunitz Trypsin Inhibitor



MATURITY : 95 days ; 100 seed wt: 14g



DEVELOPMENT OF VARIETIES WITH High oil yield (Vertical expansion)



New high oil Soybean genotype:

**NRC134 : > 22% Oil
Yield : 2.5 tonne/ha**

Varieties : NRC7 (22%)



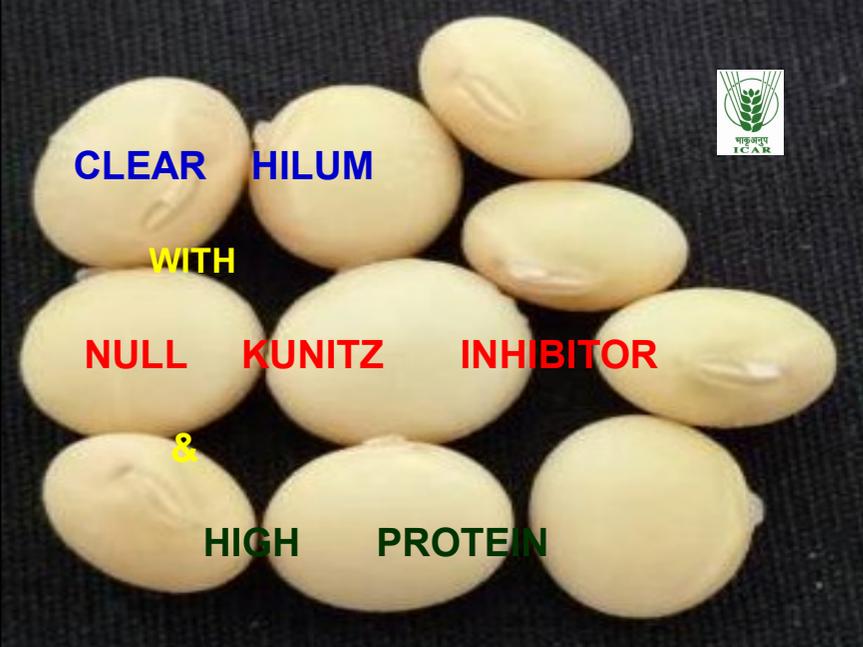
 INTERNATIONAL SOY CONFERENCE, INDORE, INDIA

SOYBEAN GENOTYPES WITH CLEAR HILUM: SOY MILK & TOFU

 ICAR



Black hilum **Brown hilum** **Clear hilum**



CLEAR HILUM
WITH
NULL KUNITZ INHIBITOR
&
HIGH PROTEIN

 ICAR

OVERCOMING PROCESSING CONSTRAINTS BY INTERVENTION AT SEED LEVEL

OLEIC ACID

PROTEIN

SUCROSE

OFF-FLAVOUR

ANTINUTRITIONAL FACTOR

ASTRINGENCY & FATTULENCE FACTORS

THANK YOU

For Specialty Soybean :

Contact : dsrdirector@gmail.com
[for transferring the non-exclusive rights : MoU]