# Significant Achievements (2021-25)

# Six new hybrids and three varieties- Notified

**ICH-5 (2021)**
**SY:1.6 t/ha (RF); Oil: 45%;**
**Rest. wilt; TN, AP, TG,Kar, MS, Odi**

**ICH-6 (2023)**
**SY:1.0-1-9 t/ha (RF & Irr):**
**Oil: 48%; Rest.:wilt; All India**

**TilhanTec SUNH-1 (2021)**
**SY:2 t/ha: Oil: 38%;**
**Rest.: Downy mildew**

**TilhanTec SUNH-2 (2024)**
**SY:2 t/ha: Oil: 38%;**
**Rest. to Downy mildew**

**TilhanTec SUNH-3 (2025)**
**SY:2.2 t/ha: Oil: 38%;**
**Rest.to Downy mildew**

**TilhanTec Til-1 (2023)**
**SY:1.0 t/ha: Oil: 45%;**
**Rest. to Alternaria, capsule borer;**
**Summer irrigated areas**

**ISH-402 (2023) (Hybrid)**
**SY:2.4 t/ha; Oil: 31%; Rest. wilt;**
**Irr. & RF areas**

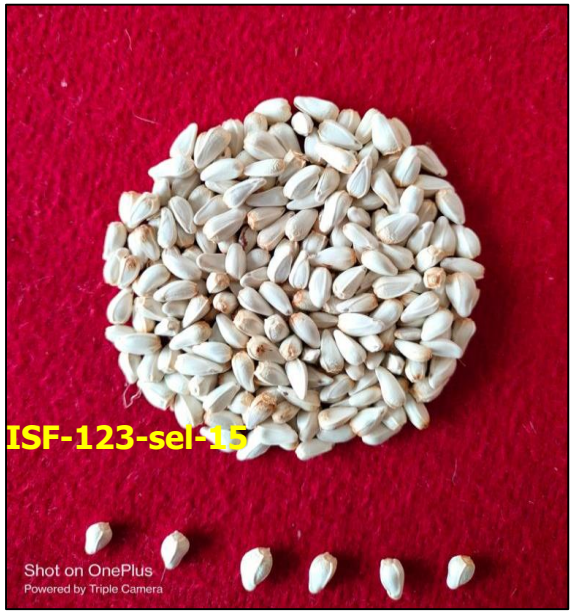
**ISH-300 (2024)**
**SY:1.8 t/ha; Oil: 38%; Rest. wilt;**
**Irr. & RF areas**

Field view of ISF-123-sel-15

**ISH-123 (2024)**
**SY:1.6 t/ha; Oil: 34%;**
**Rest. wilt; RF areas**

# Two Safflower Varieties (High oil: 38%; climate resilience) dedicated by Hon'ble PM

**Hon'ble PM Sh.Narendra Modi ji on Aug 11, 2024 dedicated 109 high yielding, climate-resilient, and bio-fortified varieties at IARI, New Delhi**


Seed yield: 1631 kg/ha; Oil yield: 564 kg/ha; Oil content: 34.3%




Seed yield: 1796 kg/ha; Oil content: 38%

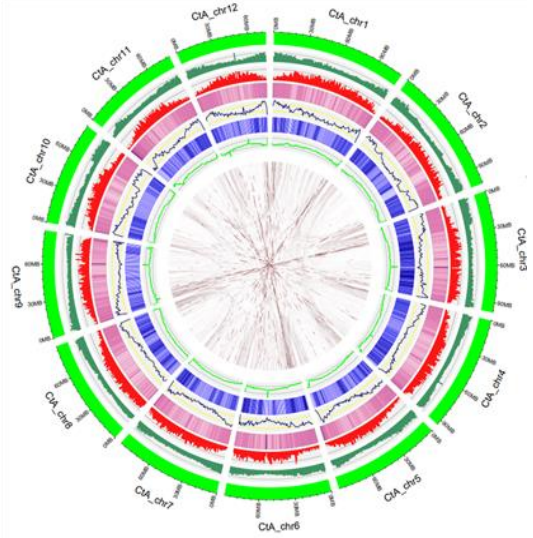
# Dedication of sunflower Hybrid: 'TilhanTec-SunH-3' by Hon'ble Union Minister for Agriculture, Farmers Welfare and Rural Development, Shri Shivraj Singh Chouhan on 97th ICAR Foundation Day celebrations (16 July 2025)


SunH-3 dedicated by Hon'ble AM

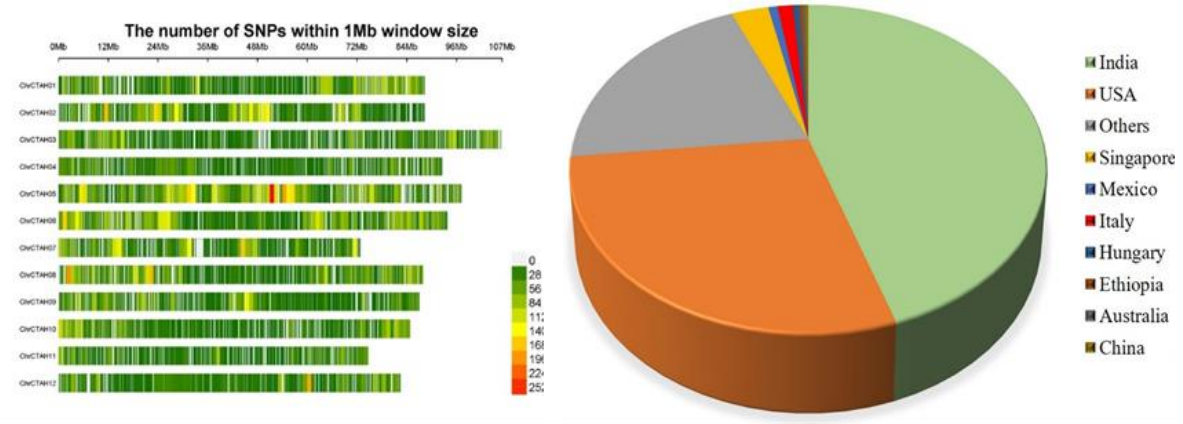

Seeds of SunH-3 in display


TilhanTec SUNH-3 (2025); SY:2.2 t/ha: Oil: 38%

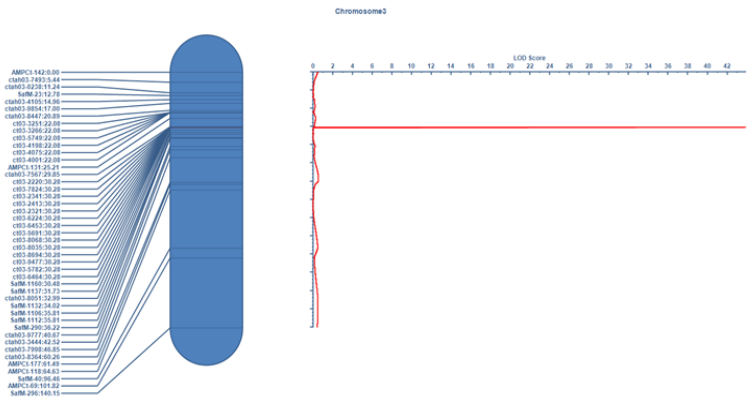
# Molecular Breeding in safflower



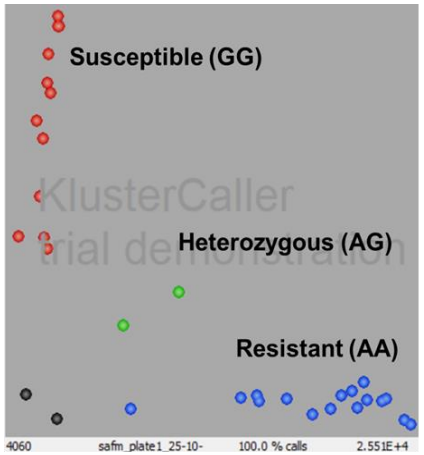

**Reference Genome of Safflower Constructed**



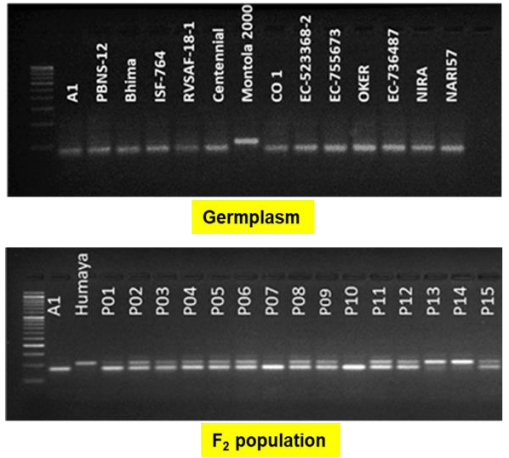

**Core Set of 540 NBPGR Safflower Accessions Developed via Genotyping**



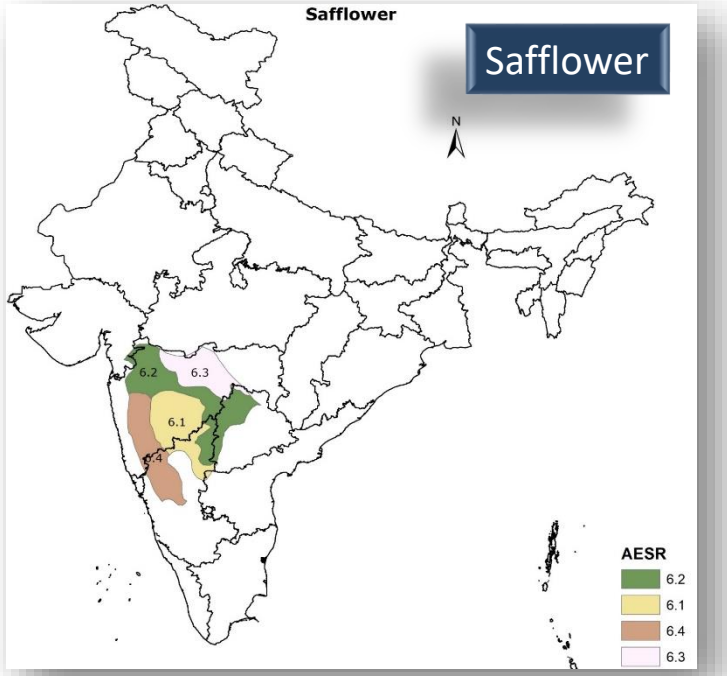

**Major QTL for Aphid Tolerance Identified and Fine-Mapped in Safflower**

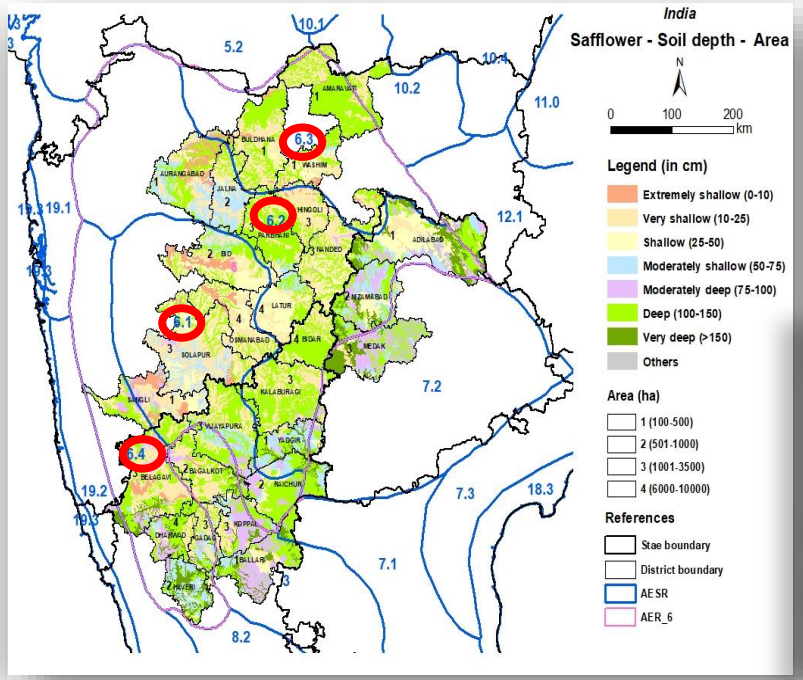



**MAS Assay for Wilt Resistance in Safflower Developed**



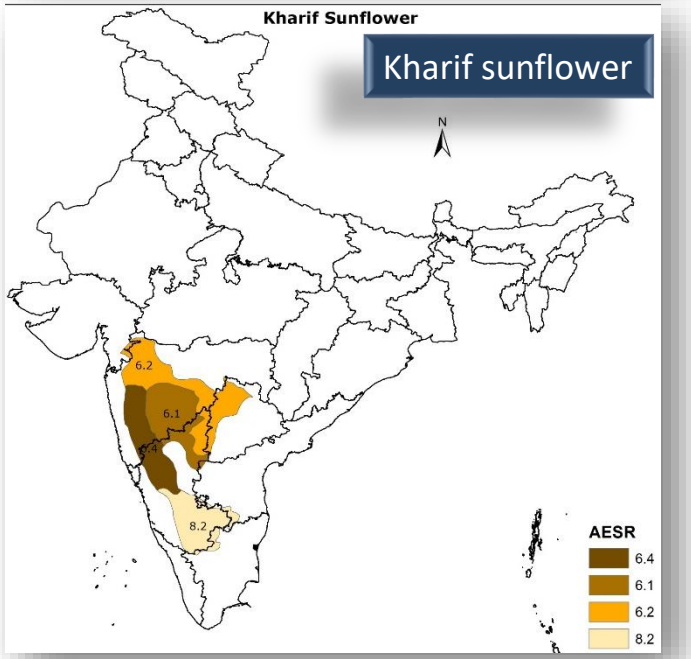

**Gel-Based MAS Assay Developed for High Oleic Trait in Safflower**

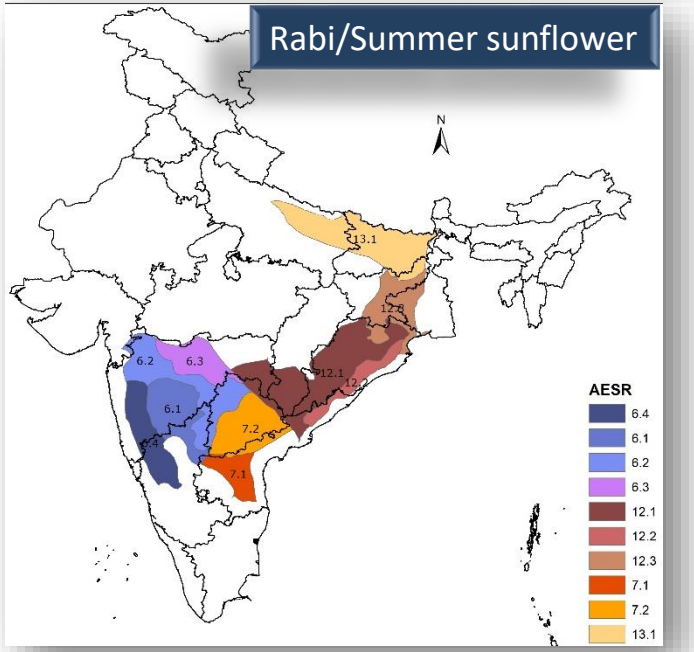


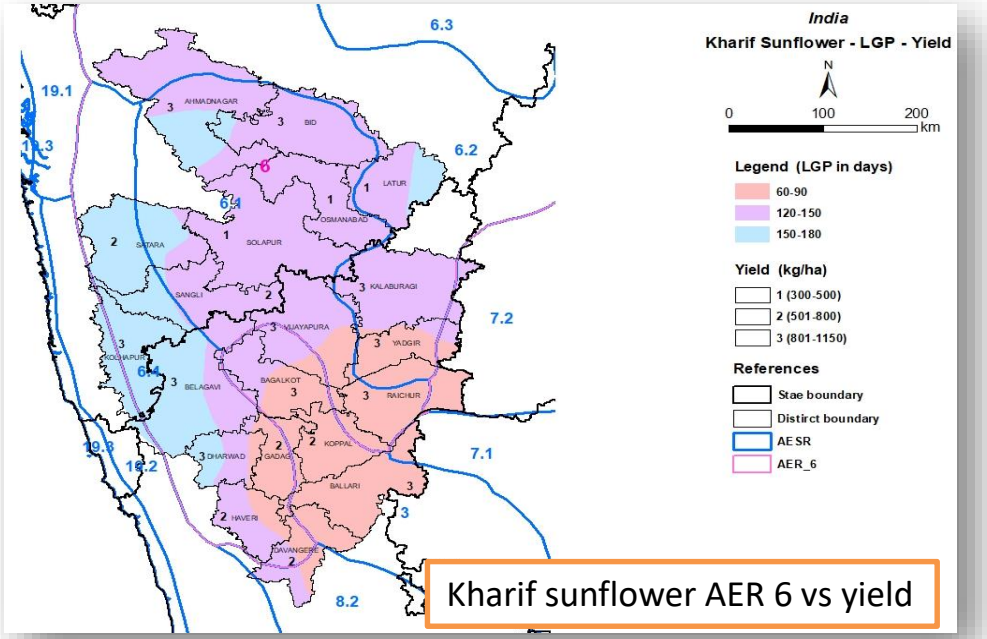




| AESR | No. of districts | A (ha) | Y (kg/ha) | Area range | | Yield range | | % Area |
|---|---|---|---|---|---|---|---|---|
| | | | | min. | max. | min. | max. | |
| 6.2 | 13 | 20189 | 735 | 72 | 9920 | 381 | 1498 | 30 |
| 6.1 | 6 | 18595 | 546 | 547 | 7293 | 421 | 632 | 28 |
| 6.4 | 9 | 13548 | 593 | 66 | 6033 | 361 | 774 | 20 |
| 6.3 | 7 | 4914 | 662 | 70 | 3359 | 464 | 1000 | 7 |

- Agro-ecological sub-region (AESR) wise area and yield of crop (mean of 5 year data)
- Soil conditions and LGP
- AESR specific interventions to ↓yield gap and to ↑area



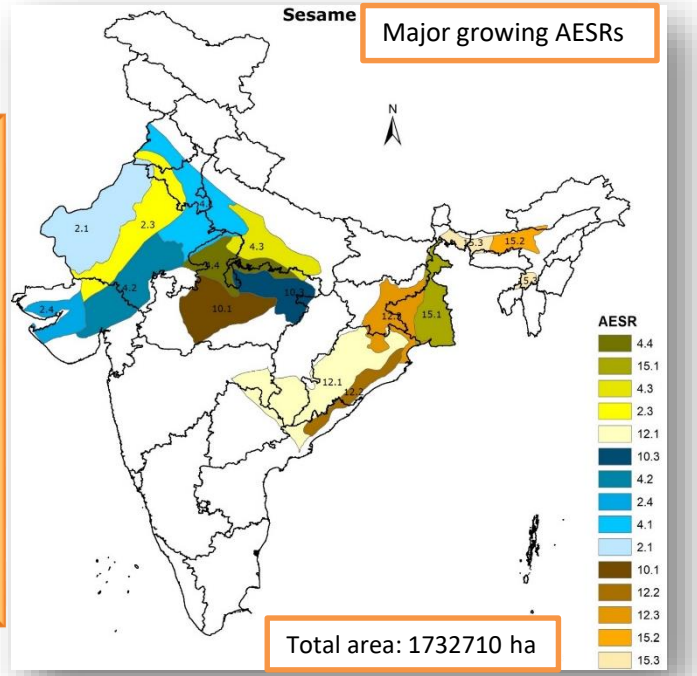



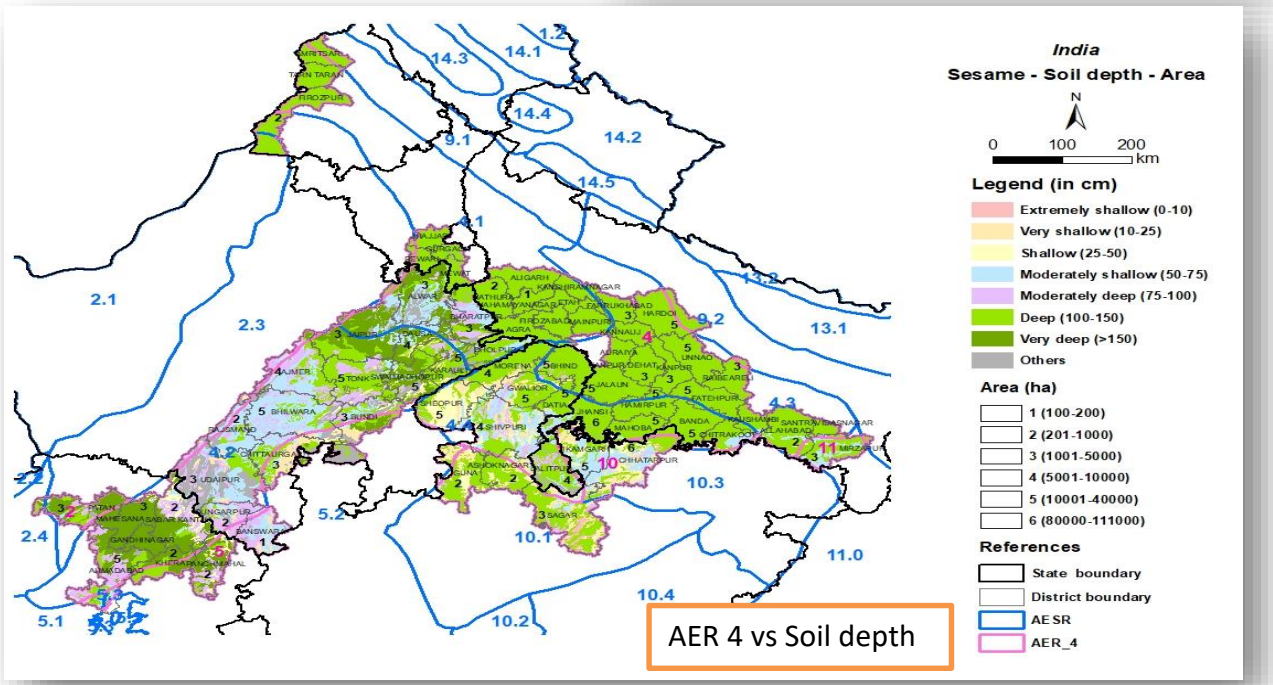

Kharif sunflower AER 6 vs yield

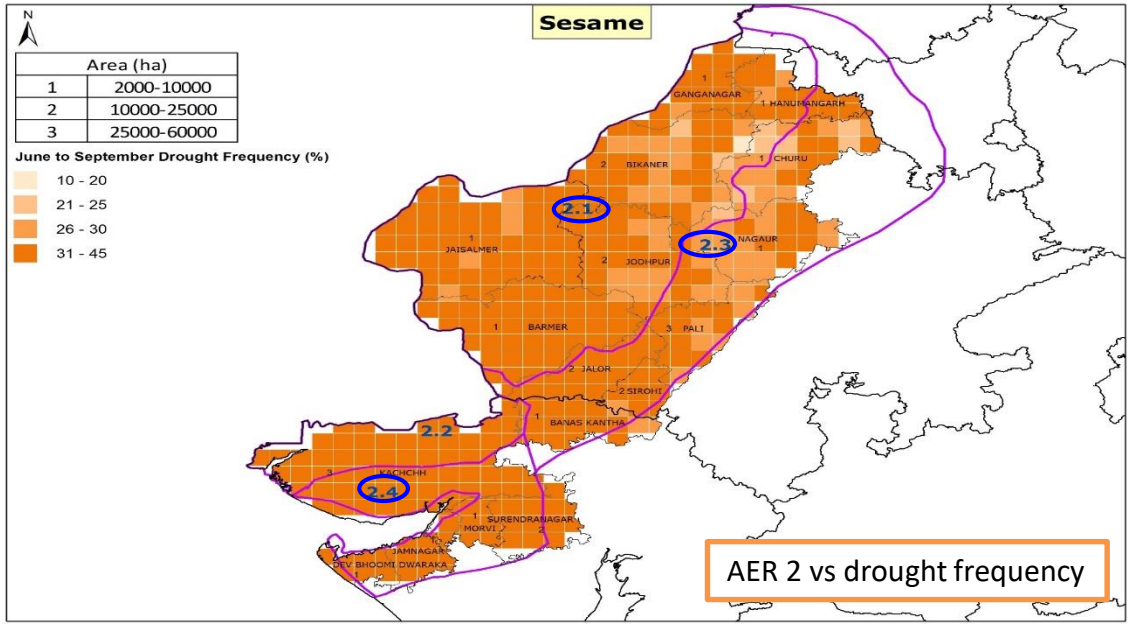
# Sesame

- Agro-ecological sub-region (AESR) wise area and yield of crop (mean of 5 years data)
- Soil conditions
- Climatic conditions
- Length of growing period (LGP)
- AESR specific interventions to ↓yield gap and to ↑area



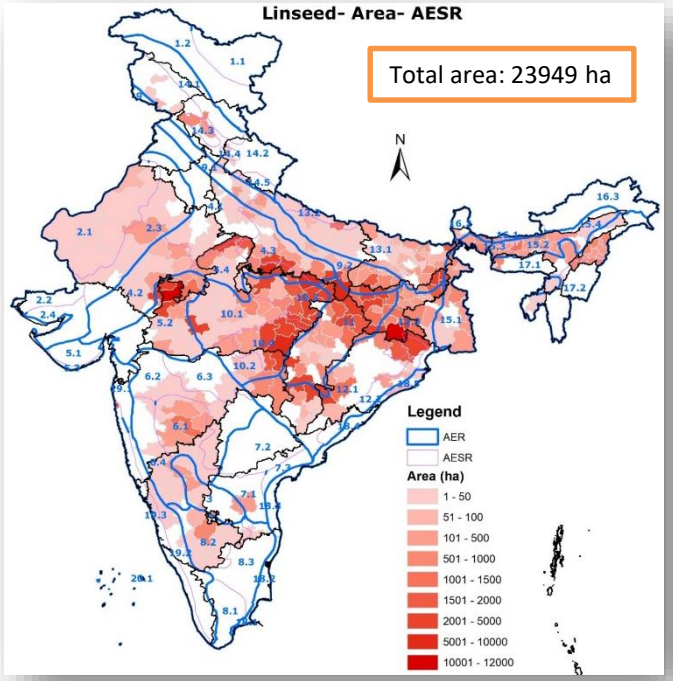

| AESR | No. of districts | A (ha) | Y (kg/ha) | Area range | | Yield range | | % Area |
|---|---|---|---|---|---|---|---|---|
| | | | | min. | max. | min. | max. | |
| 4.4 | 13 | 349286 | 409 | 258 | 110854 | 61 | 665 | 20.2 |
| 15.1 | 14 | 251312 | 779 | 205 | 81778 | 624 | 1077 | 14.5 |
| | | | | | | | | 35 |
| 4.3 | 19 | 165757 | 224 | 180 | 37479 | 105 | 680 | 9.6 |
| 2.3 | 11 | 120122 | 377 | 75 | 65608 | 204 | 863 | 6.9 |
| 12.1 | 30 | 104463 | 376 | 51 | 36617 | 194 | 658 | 6.0 |
| | | | | | | | | 23 |
| 10.3 | 9 | 80136 | 444 | 173 | 27612 | 276 | 564 | 4.6 |
| 4.2 | 20 | 78824 | 403 | 51 | 28995 | 192 | 579 | 4.5 |
| 2.4 | 5 | 76180 | 532 | 5092 | 33740 | 472 | 680 | 4.4 |
| 4.1 | 23 | 74584 | 380 | 50 | 29289 | 75 | 1000 | 4.3 |
| 2.1 | 6 | 52036 | 288 | 2090 | 21470 | 199 | 398 | 3.0 |
| | | | | | | | | 21 |



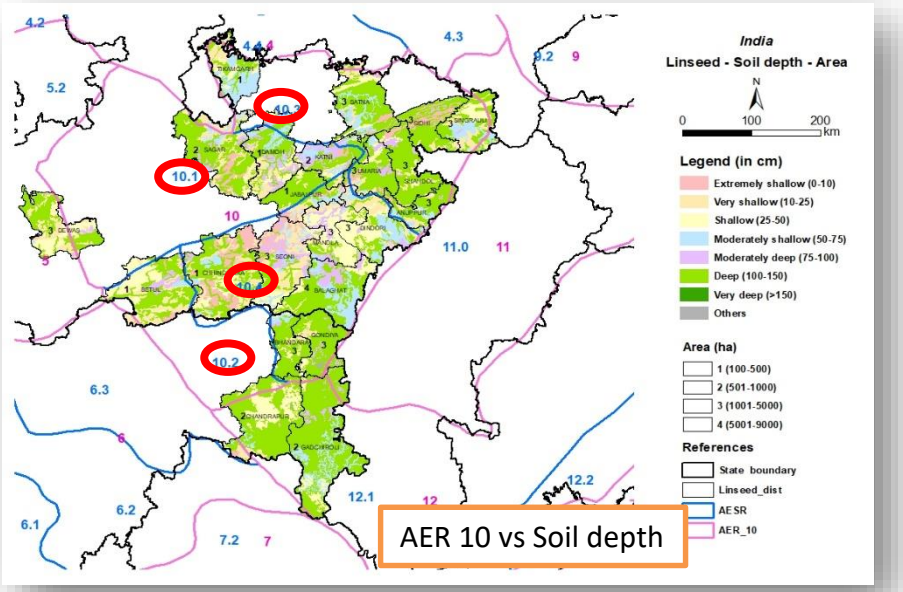



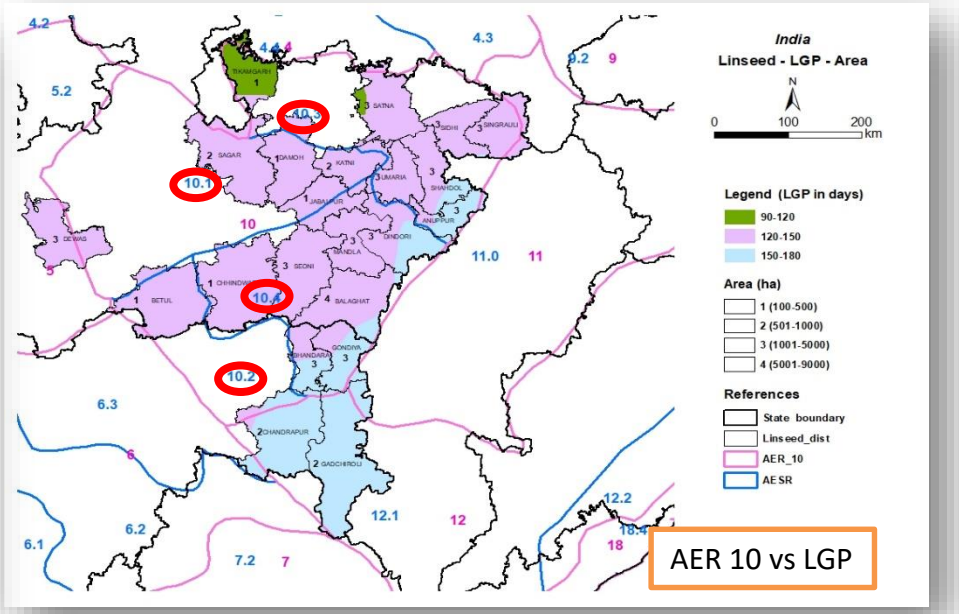
# Linseed

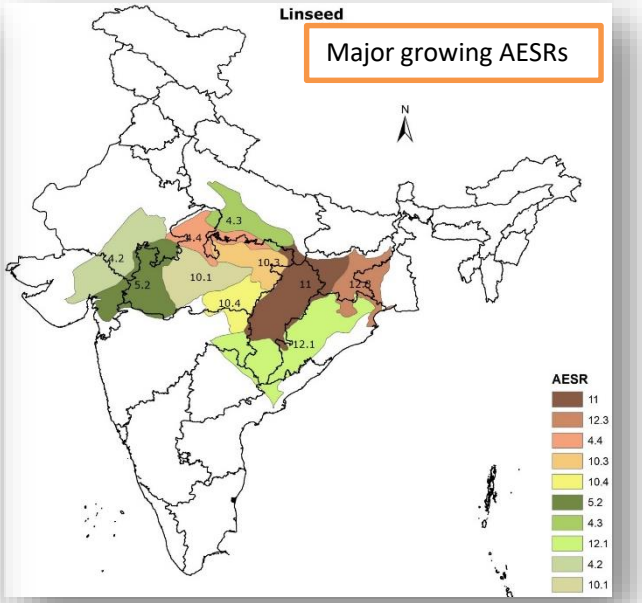
- Agro-ecological sub-region (AESR) wise area and yield of crop (mean of 5 years data)
- Soil conditions
- Climatic conditions
- Length of growing period (LGP)
- AESR specific interventions to ↓yield gap and to ↑area




| AESR | No. of districts | A (ha) | Y (kg/ha) | Area range | | Yield range | | % Area |
|---|---|---|---|---|---|---|---|---|
| | | | | min. | max. | min. | max. | |
| 11 | 19 | 40612 | 341 | 374 | 7090 | 222 | 545 | 17.0 |
| 12.3 | 19 | 37433 | 600 | 143 | 11688 | 213 | 944 | 15.6 |
| 4.4 | 8 | 23136 | 640 | 487 | 7515 | 391 | 1152 | 9.7 |
| | | | | | | | | 42 |
| 10.3 | 8 | 22126 | 615 | 148 | 4693 | 360 | 898 | 9.2 |
| 10.4 | 9 | 20186 | 512 | 111 | 8551 | 252 | 1102 | 8.4 |
| 5.2 | 8 | 18708 | 951 | 102 | 10872 | 664 | 1566 | 7.8 |
| 4.3 | 9 | 9556 | 534 | 122 | 3597 | 359 | 687 | 4.0 |
| | | | | | | | | 29 |
| 12.1 | 8 | 9303 | 426 | 190 | 2337 | 257 | 509 | 3.9 |
| 4.2 | 3 | 8030 | 940 | 183 | 6952 | 806 | 1176 | 3.4 |
| 10.1 | 5 | 6264 | 662 | 287 | 4322 | 450 | 826 | 2.6 |
| | | | | | | | | 10 |



# Identification of growth retardant and harvest aid chemical for facilitation of machine harvesting in castor

- **Paclobutrazol** at 40 g a.i./ha was identified as the **most effective growth retardant** for reducing plant height in castor by inhibiting cell elongation.
- Primary seed yield remained comparable under Paclobutrazol application (40 g a.i./ha) at both wider (90 × 60 cm) and closer (60 × 45 cm) spacings.
- **Paraquat** dichloride at 1 ml/litre was found to be the **most effective desiccant** to aid harvest in castor

With closer spacing (60X45cm), growth retardant (Paclobutrazol @40g ai/ha) along with harvest aid chemical (Paraquat dichloride @ 1ml/litre) and harvesting of only primary spikes, it is possible to get on par or higher seed yield with reduced crop duration that can facilitate machine harvesting in castor

# Technology – Safflower cropping system & soil moisture based agronomy

## Climate resilient technologies in safflower production systems

| | Growing region | Technology |
|---|---|---|
| 1a | **Southern Telangana zone**<br>AER/AESR: 6/6.2; LGP: 120-150 days;<br>Rainfall: 850 mm; Deep Vertisols;<br>Profile soil moisture: 300-350 mm | Broad Bed and Furrow (BBF) (1.2 + 0.3 m);<br>Soybean-safflower; Soybean: 4 rows/BBF x RDF;<br>Safflower: 3 rows/BBF x RDF + *Azos.* + PSB |
| 1b | **Southern Telangana zone**<br>AER/AESR: 6/6.2; LGP: 120-150 days;<br>Rainfall: 850 mm; Deep Vertisols;<br>Profile soil moisture: 200-250 mm | Broad Bed and Furrow (1.2 + 0.3 m);<br>Soybean-safflower; Soybean: 4 rows/BBF x RDF;<br>Safflower: 2 rows/BBF x 50% RDF + *Azos.* + PSB |

*S (P through SSP); B, Zn, Fe (wherever soils are deficient) were added to kharif crops; Safflower was sown in zero tillage conditions under residual soil moisture*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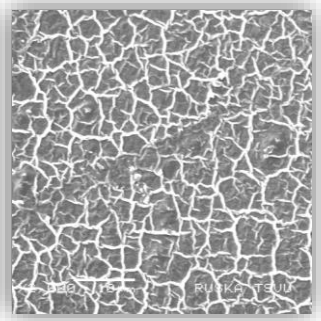
# Biopolymer-based Multilayer Seed Coating Technology for Multi-input Delivery for Crop Productivity Enhancement

**Biopolymers (Bio-1 and Bio-2) 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**

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

NAAS rating 14.04


Biopolymer2-Th4d (Biocoat)

Groundnut, Sunflower
Seed coated with biopolymer + *Trichoderma*

Groundnut, Sunflower
Seeds coated with *Trichoderma* powder


Biopolymer-1 Th4d (Biofilm)

**Patent granted: A polymer composition and a process for its preparation (Patent No. IN 515057)**