INDIAN COUNCIL OF MEDICAL RESEARCH

CALL FOR EXPRESSION OF INTEREST (EoI)

Reducing Dust Exposure and Its Respiratory Health Effects among Combine Harvester Workers

Under the SEHAT Mission (Science Excellence for Health through Agricultural Transformation)

Context

Mechanised harvesting using combine harvesters continues to expand rapidly across India's major agricultural belts. Operators and helpers, many of them seasonal migrant workers, work long shifts on largely open platforms. Throughout these shifts they inhale a complex mixture of crop and straw dust, endotoxin, fungal spores and soil-derived mineral dust. Acute effects include cough, chest tightness, rhinitis, conjunctivitis, cross-shift decline in lung function, exacerbation of asthma and organic dust toxic syndrome. With exposure repeated over successive seasons, workers face chronic bronchitis, occupational asthma, chronic obstructive pulmonary disease with accelerated lung function decline, and hypersensitivity pneumonitis, which may progress to fibrosis. The mineral fraction adds a risk of pneumoconiosis. The resulting morbidity costs workdays during critical harvest windows, reduces work capacity and earnings, and adds to India's already high burden of chronic respiratory disease. Despite this potential health and socioeconomic burden, the magnitude and characteristics of respirable and inhalable dust exposure, and their associated health effects, remain poorly characterised among combine-harvester workers in India. This evidence gap highlights the need for systematic assessment of occupational dust exposure and its health impacts and development of practical, context-specific dust-control interventions that can be integrated into mechanised harvesting operations and effectively reduce workers' exposure.

The **SEHAT Mission (Science Excellence for Health through Agricultural Transformation)**, a joint national mission of ICMR and ICAR, seeks to strengthen the evidence linking agriculture, food, nutrition and health. Within this framework, as farm mechanisation expands, there is a need for dust-control measures that protect harvest workers and can be delivered through existing manufacturing, testing and subsidy channels.

ICMR invites researchers and institutions across India to submit **Expressions of Interest for research studies to develop, evaluate and scale up measures that reduce dust exposure and its respiratory health effects among combine harvester operators and helpers**.

The proposed research may include, but need not be limited to, **operator-station engineering controls such as low-cost, filtered, positively pressurised retrofit enclosures, dust control at source, respiratory and eye protection, real-time exposure monitoring and feedback, and training and work-practice measures, alone or as combined packages**.

The focus of the EoI is specifically on **occupational dust exposure during combine harvesting and its control**. Proposals centred primarily on crop-residue burning or ambient air pollution, on noise, vibration, heat or musculoskeletal hazards without a dust-exposure component, or on machine performance without a worker exposure or health outcome, will not be considered under this call.

Research Question

Which novel engineering, personal protective and work-practice measures can effectively, affordably and sustainably reduce dust exposure and its respiratory health effects among combine harvester workers in India?

Objectives

The initiative aims to:

1. Characterise full-shift personal exposure to respirable and inhalable dust, endotoxin and other relevant agents, and the associated respiratory and ocular health effects, among combine harvester operators and helpers across crops, regions and machine types.
2. Develop, adapt and field-test dust-control measures suited to Indian combine harvesters, including operator-station engineering controls, dust control at source, respiratory and eye protection, and work-practice interventions.
3. Generate evidence on the effects of these measures on personal dust exposure, acute respiratory and ocular symptoms, and cross-shift and across-season lung function.
4. Evaluate the feasibility, acceptability, cost, sustainability and scalability of effective measures within owner-operated and custom-hire harvesting systems, and generate technical evidence to inform Indian standards for operator-station air quality.

Scope of the EoI

Proposals may focus on, but are not limited to:

- **Operator-station engineering controls**, including low-cost, filtered, positively pressurised retrofit enclosures for open-platform machines, with bench and field testing of protection factor, thermal comfort, visibility and durability;
- **Dust control at source**, through design or operational modifications that reduce dust generation or its dispersal towards the operator (e.g., at the header, residue discharge or grain unloading);
- **Respiratory and eye protection** suited to long, hot harvest shifts, with emphasis on novel and indigenously developed solutions, alongside evaluation of existing BIS-certified filtering face piece respirators, loose-fitting PAPRs and sealed goggles, with attention to fit, comfort and sustained use;
- **Real-time exposure monitoring and feedback**, such as low-cost particulate matter sensors at the operator station, exposure alerts and seasonal exposure report cards;
- **Training and work-practice interventions** for owners, operators and helpers (e.g., working upwind, filter maintenance, safe cleaning and unloading, timely care-seeking), delivered through Custom Hiring Centres (CHCs), Krishi Vigyan Kendras (KVKs) and other existing channels;
- **Exposure and respiratory health assessment** linked to intervention design or evaluation: full-shift personal sampling of respirable and inhalable dust, endotoxin and, where relevant, respirable crystalline silica and bioaerosols; standardised symptom questionnaires; and cross-shift and across-season lung function testing using spirometry;
- **Implementation and economic evaluation**, including acceptability, adoption, fidelity, cost, cost-effectiveness and willingness to pay among owners, and contractors;
- **Standards and policy linkage**, including technical specifications and test protocols for operator-station air quality suitable for adoption by BIS and Farm Machinery Training and Testing Institutes (FMTTIs), and integration with farm-mechanisation subsidy schemes;
- Other innovative **interventions to reduce dust exposure during mechanised harvesting** with a clearly defined pathway to health impact, including extension to threshers, straw reapers and balers where combine harvester workers remain the primary population.

Who Can Apply?

Researchers and institutions across India, including ICAR and CSIR institutes, DBT-supported institutions, universities, medical colleges, agricultural universities, engineering and technical institutions, public research institutions, and other eligible research organisations, are invited to submit Expressions of Interest (EoIs).

ICMR scientists are not eligible to apply under this call as PI. However, ICMR scientists can be a co-investigators in these projects, but no funds will be given for ICMR institutions or scientists in these cases.

Multidisciplinary collaborations involving expertise in **agricultural engineering, ergonomics, occupational medicine, occupational hygiene, respiratory medicine, epidemiology, implementation science or related fields** are encouraged, as are partnerships with combine harvester manufacturers, CHCs, FMTTIs, KVKs and State Departments of Agriculture that strengthen field access, co-design or scale-up.

Suggested Study Approaches

The proposed research may include:

- Randomised controlled trials, including cluster-randomised and stepped-wedge designs;
- Hybrid effectiveness–implementation studies;
- Quasi-experimental studies where randomisation is not feasible;
- Engineering design, bench and field-testing studies linked to measured worker exposure;
- Prospective cohort studies of exposure and respiratory health across harvest seasons;
- Implementation research and economic evaluation;
- Any other study design, with clear justification.

Proposals should clearly describe the dust-control intervention, target workers and harvesting context (crop, region, machine type), exposure-assessment methods, health outcomes, study design and pathway to adoption at scale. Studies that link exposure and health assessment to the co-design and field evaluation of a dust-control package, across more than one state and multiple seasons, are particularly encouraged. Stand-alone cross-sectional surveys will be considered only where they directly inform the design or evaluation of an intervention.

Duration of the project: 3 to 5 years

Budget: upto 8 crore.

Review and Selection

All submitted EoIs will be reviewed by a **Technical Advisory Group constituted by ICMR**. Proposals will be considered based on scientific merit, novelty, strength of rationale, rigour of exposure and health assessment, feasibility of field access across harvest seasons, potential public health impact, strength of multidisciplinary and inter-sectoral partnerships, and alignment with the objectives of the SEHAT Mission.

Shortlisted applicants may subsequently be invited to develop a **detailed research proposal** for further consideration under the SEHAT Mission. ICMR may facilitate linkages among shortlisted teams with complementary expertise to develop a joint multi-centre proposal.

What Should the EoI Include?

The EoI should be brief and include:

1. Title of the proposed research
2. Name and affiliation of Principal Investigator and collaborating investigators
3. Dust-control intervention proposed
4. Rationale and existing evidence
5. Target population and setting (crops, states/districts, harvest seasons, machine types)
6. Proposed study design, exposure and health assessment methods, and key outcomes
7. Pathway from intervention to reduced exposure and health impact
8. Agriculture/farm-mechanisation linkage and partners
9. Expected public health relevance and potential for translation/scale-up
10. Key references

Last date for submission: _____

Please submit the EoI online through the Google Form:

https://forms.gle/djkFA5zVzuM4wY3r7

Please note: ***Only shortlisted PIs will be contacted via email for submission of a detailed proposal***.

Submission Timeline:

- Start Date: 2nd November 2026
- End Date: 20th November 2026

For any inquiries please contact: Dr. Swati Allen, Scientist C at missionsehat.icmr@gmail.com.