AFFIDAVIT ON BEHALF OF THE DEPARTMENT OF AGRICULTURE & FARMERS WELFARE, PUNJAB

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL, PRINCIPAL BENCH, NEW DELHI

Original Application No. 621/2025

In the matter of:

Suo Motu proceedings based on news item titled "Climate Change imbalance in fertilizer use impacts soil's organic carbon: ICAR study"

AFFIDAVIT

I, Gurjit Singh Brar, Director of Agriculture, Department of Agriculture & Farmers Welfare, Punjab, having my office at Kheti Bhawan, Institutional Site No.204, Phase-6, Mohali, Punjab, do hereby solemnly affirm and state as follows:

1. That I am the Director of Agriculture, Punjab, and am well-conversant with the facts and records of the present matter. I am competent and authorized to swear this affidavit on behalf of Respondent No. 6, i.e., the Department of Agriculture & Farmers Welfare, Punjab.
2. That this affidavit is filed in compliance with the directions of this Hon'ble Tribunal regarding the scientific and judicious use of fertilizers, soil health management, maintenance of Soil Organic Carbon (SOC), and prevention of environmental degradation.
3. That the Department is actively implementing multiple interventions aimed at improving soil health, balanced nutrient management, reducing chemical fertilizer misuse, and promoting organic/natural farming.

NOTARY ANITA BANSAL Regn. No. 8021 Chandigarh U.T. Valid up to 07/06/2030 GOVT. OF INDIA

VIEWS AND SUBMISSIONS REGARDING THE ICAR STUDY AND THE NEWS SUBMITTED BY PUNJAB AGRICULTURAL UNIVERSITY, LUDHIANA

"Fertilizer Use in Punjab: Narrative Needs to be Right"

4. Punjab is widely known as the breadbasket of India, primarily due to its significant contributions to national food grain production. Since the Green Revolution of the 1960s and 70s, the state has witnessed a dramatic transformation in its agricultural practices. High-yielding varieties of seeds, increased mechanization and the extensive use of chemical inputs such as fertilizers and pesticides played a crucial role in enhancing productivity.

However, this success story has been shadowed by a disturbing trend—what many experts are now calling a "fertilizer frenzy" which has triggered serious concerns about environmental sustainability, mounting fiscal pressure and the degradation of long-term soil health.

According to the Fertilizer Association of India, the annual fertilizer consumption is highest for Uttar Pradesh, Andhra Pradesh and Maharashtra which reflects the intensity of agricultural activity in these states, where multiple cropping seasons, large cultivated areas and high-yielding varieties demand greater nutrient inputs. In contrast, Punjab—though a major contributor to India's food grain production—records a comparatively lower annual fertilizer consumption. Recent estimations indicate that in Punjab, each kilogram of fertilizer yields approximately 16.24 kg of food grain, compared to 11.05 kg for India as a whole. These figures suggest that fertilizer application in Punjab not only enhances agricultural productivity but also leads to greater profitability and returns on investment. This could be attributed to the more efficient nutrient management practices in the state.

While there are growing concerns nationally about the overuse of fertilizers, Punjab cannot be broadly categorized as a state with excessive or indiscriminate fertilizer usage leading to soil degradation. On the contrary, data and field-level trends reveal a more nuanced and improving situation.

5. **Cropping Intensity and High Productivity in Punjab**

Punjab ranks among the top states in India in terms of cropping intensity, a key indicator of agricultural efficiency. According to India Stat and Directorate of Economics & Statistics, the cropping intensity in Punjab stands at approximately 189%, much higher than the all-India average of about 145%. In the last few years, spring/summer maize has emerged as a third high yielding and thus high fertilizer consuming crop. This indicates that farmers in Punjab are

taking more crops per year from the same land than other states, a reflection of better resource utilization and soil management practices. Punjab continues to maintain top-tier productivity levels across several major crops. For instance:

- Wheat productivity in Punjab is over 5 tonnes/ha, well above the national average (~3.5 tonnes/ha).
- Paddy yields are consistently around 6–7 tonnes/ha, among the highest in the country.

Such high yields are not possible without maintaining soil fertility and adopting efficient nutrient and water management practices.

6. Nutrient Uptake and Balanced Fertilization

Crop nutrient uptake in Punjab is closely monitored and efforts are being made to balance fertilizer application with actual crop needs. For example:

- The nutrient uptake pattern from crops like wheat, paddy and maize is matched with recommended doses and the Fertilizer Use Efficiency is improving through soil testing, neem-coated urea and precision farming.
- Punjab's average fertilizer consumption, though higher than the national average, is aligned with its higher cropping intensity and productivity. Hence, comparing fertilizer use without factoring in cropping intensity and nutrient output leads to misleading conclusions.

7. Improvement in Soil Health – Evidence from Soil Organic Carbon

Contrary to the perception of declining soil health, soil organic carbon (SOC) status in Punjab has improved significantly over the decades. SOC is widely recognized as the most reliable indicator of soil health, as it directly influences soil fertility, structure and biological activity, reduces erosion and helps mitigate climate change by sequestering atmospheric carbon. High SOC levels enhance nutrient availability, water retention and microbial activity, all of which are vital for sustainable crop production. It is also sensitive to land management practices, making it an excellent parameter for monitoring long-term soil health.

In Punjab, the steady increase in SOC from 0.33% (1981–90) to 0.53% (2011–23) reflects significant improvement in soil quality and sustainability. Based on the data from PAU, Ludhiana from 1981–1990, only 1% of soil samples were in the high organic carbon category (>0.75%), with an average OC of 0.33%. By 2011–2023, this increased to 15.4% of samples in the high category and the average organic carbon content rose to 0.53%. The percentage of low organic carbon soils (<0.40%) has dropped dramatically from 78% in 1981–90 to 31.1% in 2011–23. This positive trend is a direct result of improved agronomic practices, the adoption of crop residue management, the promotion of organic inputs, and balanced fertilization.

While concerns about fertilizer overuse are valid at the national level, Punjab stands out for its scientific, monitored and increasingly sustainable approach to nutrient management. With high cropping intensity, top productivity and improving soil health indicators like organic carbon, the narrative of soil degradation in Punjab due to fertilizer use is not supported by data.

Going forward, PAU, Ludhiana continues to promote the following practices for judicious use of fertilizers:

- *Integrated Nutrient Management (INM)*: In most of the crops the integrated use of biofertilizers, organic manures and chemical fertilizers can lead to higher productivity and enhanced nutrient use efficiency. In paddy crop use of farmyard, press mud, poultry manure, gobar gas slurry, prali char, green manure and summer moong crop residue incorporation can save 35-55 kg urea per acre along with maintaining the soil health of soil.
- *Soil testing-based recommendations*: Currently, PAU has 17 soil and water testing laboratories in different districts of Punjab. The farmers are advised for fertilizer application on the basis of soil testing.

In fact, it is with regard to sub optimal use of secondary and micro nutrient elements fertilizers which are not being used judiciously both in quantity and quality. Farmers of Punjab are very inquisitive and receptive to the technology and in the present era of precision agriculture where site specific nutrient management is gaining popularity and, in their views, the fertilizer use efficiency would further increase. With the release of nutrient efficient varieties such as rice variety PR 132, which requires 25% less than the recommended N fertilizer, is a big leap in this regard and breeding of other N efficient crop varieties would further save upon fertilizer consumption in future. The adoption of the recommended practices by PAU will not help reduce fertilizer usage, but will also reduce carbon footprints thus making the environment more sustainable. Additionally, PAU has been proactive in advocating for integrated nutrient management approaches. This strategy emphasizes reducing dependency on synthetic fertilizers through the incorporation of organic manures, green manures, bio-fertilizers and recycling of crop residues, thus enhancing soil health and reducing environmental impacts.

The data on SOC clearly indicated that fertilizer use in Punjab has not deteriorated soil health but rather aligned with the actual nutrient demands of crops. In this context, the application of fertilizers in Punjab is a well-calculated response to the intensive nutrient demands of high-yielding crop varieties grown under multiple cropping systems.

Rather than indicating overuse, it reflects a balanced and need-based approach to nutrient management. Farmers are increasingly adopting scientific recommendations and good agricultural practices to match fertilizer application with soil test values and crop requirements. This careful and responsible use of fertilizers not only prevents soil nutrient exhaustion but also supports long-term

agricultural sustainability. Therefore, sweeping generalizations about fertilizer overuse in Punjab need to be reconsidered in light of authentic data and ground realities. Hence, the current fertilizer use pattern in Punjab is justified and does not support the perception of indiscriminate or excessive application.

8. With reference to the email dated 06.02.2026 which included the news, published by The Hindu dated 10.11.2025 entitled "Climate change, imbalance in fertilizer use impacts soils organic carbon: ICAR study" and a study by Bahera et al 2025 which is based on the analysis of 254,236 topsoil samples collected from 29 states and 620 districts across India between 2019 and 2024.

The study primarily assessed the spatial distribution of soil organic carbon (SOC) in cultivated soils and examined its relationship with average annual rainfall (AAR), elevation (E), and average annual maximum temperature (AAMT) of India. This study does not include a temporal framework for evaluating the long-term impacts of intensive agriculture and fertilizer use on SOC dynamics, thereby limiting its applicability for assessing baseline-to-present SOC changes in Punjab.

The study reported that 7.5%, 25.5%, and 43.5% of the cultivated area had SOC contents of ≤0.25%, >0.25 to ≤0.50%, and >0.50 to ≤0.75%, respectively. Further, 10.8% and 12.7% of the area recorded SOC contents of > 0.75 to ≤1.00% and > 1.0%, respectively. Soils with SOC content of > 0.25–0.50%, covering about 25.5% of the area, were distributed across parts of Punjab, Haryana, Delhi, Uttar Pradesh, Rajasthan, Madhya Pradesh, Gujarat, Maharashtra, Andhra Pradesh, Telangana, Puducherry, and Tamil Nadu. Approximately 43.5% of the area with SOC content of > 0.50–0.75% was found distributed in some portions of Himachal Pradesh, Punjab, Uttar Pradesh, Haryana, Delhi, Madhya Pradesh, Bihar, Gujarat, Jharkhand, West Bengal, Assam, Arunachal Pradesh, Manipur, Maharashtra, Odisha, Chhattisgarh, Telangana, Andhra Pradesh, Karnataka, Puducherry, and Tamil Nadu. This study assessed the spatial pattern of SOC distribution in cultivated areas and evaluated the relationship of SOC with average annual rainfall (AAR), elevation, and average annual maximum temperature (AAMT) of India.

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The temporal evolution of SOC under intensive agriculture in Punjab can be assessed using the soil testing database of the Department of Soil Science, Punjab Agricultural University (PAU), Ludhiana, comprising approximately 3.86 lakh soil samples of Punjab analysed over nearly four decades. During 1981/82 to 2005/06, analysis of 3.19 lakh soil samples was conducted (Benbi et al., 2009). The weighted average for SOC increased from 0.294% in 1980/81 to 0.40% in 2004/05. This period was marked by a clear shift in SOC distribution,

with soils in the medium (0.40–0.75%) and high (> 0.75%) SOC categories increasing, while the low SOC category (< 0.40%) declined. The frequency of samples falling into the medium and high categories during the periods 1980/81 to 1985/86 and 2000/01 to 2005/06 increased from 16.8–23.4 to 33.9–45.6 % and 0.2–0.4 to 2.2–8.3 %, respectively. During the period 1981/82 to 1984/85, more than 52 to 56 % of the samples contained low SOC, whereas during 2002/03 to 2005/06, only 33.7–46 % of the samples fell into this class.

Further improvement in SOC status was observed during 2005/06 to 2019/20, based on the analysis of 0.67 lakh soil samples. The weighted mean SOC content increased from 0.41% to 0.54% over this 15-year period. The proportion of soils in the medium SOC category increased from 45.0% to 52.3%, while the high SOC category expanded substantially from 5.0% to 15.6% (Kuldip-Singh et al., 2023). Simultaneously, soils in the low SOC category declined sharply from 55.5% to 26%, indicating a sustained improvement in SOC status under intensive cropping systems in Punjab.

In this context, soil testing data from the Department of Agriculture and Farmers Welfare, Punjab, are crucial for assessing state-level SOC dynamics and long-term effects of agricultural intensification.

Continuous temporal and spatial soil sampling remain critical for monitoring future trends in SOC under changing management and climatic conditions.

Reference:

1. Benbi, D.K. and J.S. Brar: A 25-year record of carbon sequestration and soil properties in intensive agriculture. *Agron. Sustain. Develop.*, **29**, 257-265 (2009).

2. Kuldip-Singh, Dhanwinder-Singh, Toor A.S., Choudhary O.P. and Chandel Sumita (2023) Improvement in soil fertility under long-term intensive irrigated agriculture Punjab (North-west India) scenario., 44, 229-237. Journal of Environmental Biology

SCHEMES & INITIATIVES BY THE DEPARTMENT OF AGRICULTURE& FARMERS' WELFARE, PUNJAB FOR SOIL HEALTH AND JUDICIOUS USE OF FERTILISERS

9. **Soil Health Card Scheme**

a) That under the Soil Health & Fertility Scheme, the Department has achieved significant milestones for the current fiscal year. To date, 271,174 soil samples

have been collected across all districts of Punjab. Of these, 191,120 samples have already been processed and analysed through Government soil testing laboratories.

b) That the Department has issued over 30.00 lakh Soil Health Cards to farmers across the state. These cards provide a comprehensive nutritional profile of the soil—specifically monitoring Nitrogen, Phosphorus, Potassium, Sulphur, Zinc, Iron, and Organic Carbon—alongside customized, crop-wise fertilizer recommendations. Notably, 24.31 lakh of these cards were distributed during Cycle-1, Cycle-2, and the Model Village Programme, successfully achieving universal coverage of all farmers in Punjab.

c) That the implementation of this scheme has led to a measurable shift toward sustainable agriculture. Key outcomes include a significant decrease in the irrational use of fertilizers, particularly the over-application of Urea and a gradual and steady improvement in soil organic carbon levels across the region.

d) That to ensure long-term adoption of balanced fertilization, the Department has conducted the awareness camps hosted at the village, block, and district levels to train farmers on precision application techniques and for active promotion of organic farming and the use of organic fertilizers to reduce the state's overall dependency on chemical inputs.

10. **Promotion of Organic Fertilizers**

a) That the Department has intensified efforts to increase the adoption of organic fertilizers, aiming to significantly reduce the agricultural sector's reliance on chemical inputs. Central to this transition is the Market Development Assistance (MDA) scheme, which provides a robust framework for promoting Fermented Organic Manure (FOM) and Liquid Fermented Organic Manure (LFOM).

b) That under the MDA scheme, the Government of India and the Department provide strategic assistance to Compressed Biogas (CBG) plants. This support is designed to streamline the distribution and adoption of FOM and LFOM, ensuring these nutrient-rich organic byproducts are readily available and utilized by the farming community.

c) That to build confidence in organic alternatives, the Department has implemented an extensive demonstration program under the Crop Residue Management (CRM) scheme covering approximately 900 hectares of land have been dedicated to demonstrations across 8 districts of the state to provide

hands-on education to farmers regarding the practical application and benefits of using organic fertilizers, FOM, and LFOM in place of traditional chemicals.

11. **Paramparagat Krishi Vikas Yojana**

a) That under the Paramparagat Krishi Vikas Yojana, the Department is promoting Organic Farming in the state. Over the years, 18,000 acres of farmland have been registered and certified by recognised agencies, ensuring compliance with the highest quality standards i.e. NPOP & USDA-NOP.

b) That the Department has successfully completed 350 clusters covering a total area of 17,500 acres under Organic farming through PAGREXCO in the state.

c) That regular trainings, awareness camps, exposure visits and on-field technical support are being provided to farmers to ensure sustainability and scalability.

c) That an action plan has been developed for the approved 250 clusters covering a total area of 12,500 acres for the period 2024-25 to 2026-27.

12. **National Mission on Natural Farming (NMNF)**

a) That the State is actively implementing the National Mission on Natural Farming to promote chemical-free, climate-resilient agriculture. During the current fiscal year (2025-26), the mission has successfully enrolled 5,410 farmers across 5 key districts.

b) That to date, approximately 5,368 acres of agricultural land have been transitioned to natural farming practices. This shift focuses on restoring soil health and biodiversity while reducing the cost of cultivation for the farming community.

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c) That to ensure that the transition to natural farming is both sustainable and scalable, the Department provides comprehensive support through Skill Development, Regular training sessions on the preparation of indigenous microbial formulations, Awareness & Outreach through local camps to educate communities on the long-term benefits of natural inputs, Exposure visits to established natural farms to facilitate peer-to-peer knowledge sharing and Continuous on-field technical assistance to address site-specific agricultural challenges.

d) That building on the success of the current phase, the Department has developed a robust action plan for further expansion. For the upcoming year (2026-27), the mission will be extended to 10 districts, doubling its regional footprint and significantly increasing the target area for natural farming.

13. **PM-PRANAM Scheme: Fertilizer Consumption Analysis**

The implementation of the PM-PRANAM (Programme for Restoration, Awareness, Nourishment and Amelioration of Mother Earth) scheme has led to a measurable shift in fertilizer usage patterns. For the year 2024-25, the state recorded a significant reduction in chemical fertilizer consumption compared to the average of the previous three years.

Year	Details regarding consumption of Chemical Fertilizers (in MT) (Urea, DAP, NPK, MOP)				
	Urea	**DAP**	**MOP**	**NPK**	**Total**
2021-22	3151199	545746	56606	135940	3889491
2022-23	3128887	803048	40028	52054	4024017
2023-24	3207092	710132	5251	87999	4010474
Average of 3 years	**3162393**	**686309**	**33962**	**91998**	**3974662**
2024-25	3005207	600609	93543	163400	3862759
Reduction/Increase	**-157186**	**-85700**	**+59581**	**+71402**	**-111903**
Percentage reduction/increase	**-4.97**	**-12.49**	**+1.75**	**+77.61**	**-2.82**

The data clearly indicates a decrease in the consumption of Urea (by 4.97%) and DAP (by 12.49%) in 2024-25 compared to the average of the previous three years. While the consumption of MOP and NPK fertilizers has increased, this rise is likely attributable to the promotion of balanced fertilizer use, which has positively influenced the state's NPK ratio.

Overall, there has been a reduction of 2.82% (111,903 MT) in the total fertilizer consumption during 2024-25 compared to the average of the preceding three years. This decrease signifies a saving in fertilizer subsidy for the state.

14. **Crop Residue Management (CRM) Scheme**

a) That since 2018-19, the Department of Agriculture & Farmers' Welfare, Punjab, has been rigorously implementing the Crop Residue Management (CRM) Scheme. The primary goal of this initiative is to eliminate stubble burning, thereby safeguarding public health and preserving the state's ecological balance.

b) That the practice of burning crop residue is highly detrimental, leading to severe air pollution, respiratory health hazards, and the loss of essential soil nutrients. To provide sustainable alternatives, the Department offers specialized CRM machinery at subsidized rates. Since the scheme's inception, approximately

1.60 lakh CRM machines have been distributed to farmers, enabling efficient in-situ and ex-situ residue management.

c) That to foster a behavioural shift among the farming community, the Department conducts extensive Information, Education, and Communication (IEC) activities. These initiatives sensitize farmers to the ill effects of paddy stubble burning through Village and block-level awareness camps, *Nukkad Nataks* (street plays) and publicity vans, practical machine demonstrations to ensure proper equipment utilization.

d) That the concerted efforts of the Department, coupled with the active participation of farmers, have resulted in a dramatic decline in farm fire incidents over the last five years.

Year	**Number of Fire Incidents**	**% Reduction (Year-over-Year)**
2020	83,002	—
2021	71,304	-14.1%
2022	49,922	-30.0%
2023	36,663	-26.6%
2024	10,909	-70.2%
2025	5,114	-53.1%

15. **Awareness, Capacity Building, and Monitoring**

a) Extension and Education Initiatives

To drive the adoption of sustainable practices, the Department executes a comprehensive outreach strategy under various state and central schemes:

- Farmer Awareness Camps: Thousands of community-level sessions are conducted annually to educate the farming community.
- Specialized Training: District and block-level programs focusing on Balanced Fertilization and Integrated Nutrient Management (INM).
- Practical Demonstrations: Large-scale field trials showcasing the long-term benefits of soil health restoration.

B. Data-Driven Decision Making

The Department maintains a rigorous analytical framework to monitor fertilizer trends:

- Trend Analysis: Consumption data is periodically reviewed at both state and district levels to detect nutritional imbalances.

- Corrective Advisories: Based on these findings, technical advisories are issued to district authorities to guide farmers toward optimal fertilizer application.

C. Monitoring and Supply Chain Management

State-level quality control campaigns ensure a transparent and efficient fertilizer distribution network:

- PoS Device Enforcement: Regular monitoring ensures all sales are recorded via Point of Sale (PoS) devices, enhancing transparency.
- Demand-Based Distribution: Real-time data allows the Department to mobilize fertilizer stocks based on actual district demand and recommended usage patterns.

D. Vigilance and Prevention of Misuse

The state maintains a strict policy against the diversion of agricultural fertilizers for industrial or non-agricultural purposes:

- Vigilance Committees: Multi-departmental task forces have been established at the state and district levels.
- Enforcement: These groups actively monitor the supply chain to prevent the misuse of subsidized fertilizers and curb any unethical trade practices.

16. That the Department is committed to environmental protection, soil conservation, and compliance with the Environment (Protection) Act, 1986 and Water (Prevention and Control of Pollution) Act, 1974.

17. That the contents of the present affidavit are true and correct to my knowledge and belief, and nothing material has been concealed.

VERIFICATION

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Verified at SAS Nagar, Punjab on this 23rd day of February, 2026, that the contents of the above affidavit are true and correct to my knowledge. No part of it is false and nothing material has been concealed therefrom.

The contents of this Affidavit/Document
been explained to the deponent/executant
He/She has admitted the same to be correct
The deponent/executant has signed Register
at Sr No 1493 P No 21 Date 23/02/2026

DEPONENT

(Gurjit Singh Brar)

Director Agriculture
Department of Agriculture
& Farmers' Welfare,
Punjab.

23 FEB 2026

Attested as Identified
ANITA BANSAL
Notary Chandigarh (U.T.)