HCFI Dr KK Aggarwal Research Fund

Round Table Environment Expert Zoom Meeting on "Cloud Seeding/Artificial Rain: Is It a Solution for Controlling Air Pollution in Delhi-NCR"

November 2, 2025, Sunday (12 noon-1 pm)

- Air pollution in Delhi-NCR spikes up every winter and reaches to poor and severe category leading to respiratory illness in many individuals.
- The winter action plan to control air pollution has not been effective to overcome the situation.
- Three trials of cloud seeding has been done by government of Delhi. A MoU has been signed with IIT Kanpur with a budget of 3.21 crore for five trials of cloud seeding. The first was on Oct 23, second on Oct 28.
- Cloud seeding is a weather modification process involving dispersion of chemicals like silver iodide and other chemicals into pre-existing clouds to enhance their ability to produce rain. The idea is to produce artificial rain to wash away the smog.
- On Oct 28, eight flares of silver iodide and sodium chloride were fired in phases using Cessna aircraft. The first phase began from Meerut with cloud seeding done at Burari, Karol Bagh and Mayur Vihar. The second phase was also carried out later in the day. Despite these two trials, there was no rain as the required meteorological conditions were not favorable as the moisture content was low around 10-15%.
- Such efforts have already been made by the National Physical Laboratory (NPL) in 1957 and also by different states like Tamil Nadu (in the 1980s), Karnataka and Maharashtra (2000-2010).
- The effectiveness is conditional. The chances of success increase in the presence of sufficient moisture content and better microphysics condition.
- Cloud seeding has been performed successfully in Dubai, where it resulted in 10-30% increase in rainfall in some areas. The purpose was not to control pollution but to enhance water resources in arid regions. Also, there are fundamental differences in meteorological conditions. Conditions in UAE are often conducive enough resulting in measurable outcomes. The window of opportunity for Delhi is rare unlike in Dubai.
- Drones should have been used instead of Cessna aircraft, as in China and in the US, France, Austria. Technology should be advanced.
- The success rate is 15-20% and offers only short-term advantage. Cloud seeding can only precipitate the moisture that is in the atmosphere. If not moisture then it is a failure.
- Silver iodide has dangerous effect on the soil; crop gets dried, bacteria/algae formation; useful bacteria are destroyed. Children are also affected. Hence, the adverse impact of silver iodide should be considered. Although, it has been stated that the concentration which is injected in the atmosphere gets diluted as it approaches the ground. So, it has negligible impact.
- More effort is made on pollution management than on pollution control.
- Pollution sources are continuous. Even after heavy rains, the PM2.5 increases after 20-25 minutes because the vehicular concentration and industrial emissions are very high.
- Research is needed on how to use parali (stubble or crop residue) to make byproducts.
- Primary pollutants react in the presence of sunlight and from secondary pollutants (ozone, secondary aerosols – organic and inorganic) in the lower atmosphere. These also need to be monitored.
- VOC monitoring stations will give background data which will help in validating source apportionment models, air pollution prediction models and also identify the exact sources of secondary pollutants, so that a strategy can be formed to control them.
- It has been shown that there is 25% contribution of secondary inorganic pollutants in PM2.5.
- Cloud seeding is just an experiment and not a solution. It is a very expensive technique and not a temporary and unsustainable solution for the Delhi-NCR region, which is situated in land-locked Indo-Gangetic plain. Rain-bearing clouds/moisture is needed, which is not available at this time from Oct-Dec.
- This experiment will give knowledge for future campaigns. Scientists should work on the uncertainty estimation of various attributable factors of meteorological and also microphysics. It should be planned

properly because of the high costs involved in carrying out such experiments. There should be better modelling methods to predict the optimum conditions and the uncertainty proportion.

- The focus should be on sustainable solutions including airshed management and source control measures, including transport source, road resuspension dust, construction dust, burning of waste and other sources. Increasing greenery, improving traffic system and controlling emissions.
- We need to focus more on airshed management approach and source control measures.

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