THE INDIA FORUM
A JOURNAL-MAGAZINE ON CONTEMPORARY ISSUES

August 29, 2026

Before Delhi Chokes and Starts Blaming Farmers Again

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A crisis mode of governance operates while addressing the twin problems of Delhi's smog and stubble burning, resulting in unproven and counterproductive solutions being pushed onto farms.

August is that time of the year when Delhi experiences rain and relatively breathable air. On the outskirts of the city, farmers have finished sowing rice, which they will begin harvesting from mid-September onwards. Readers might consider this the proverbial lull before all hell breaks loose.

The onset of winter will take Delhi's AQI towards the four-figure mark, and media will train their cameras on burning fields spewing smoke and soot as the usual suspects. Many in Delhi, likely gasping for air, will ask: why can't farmers just stop their mindless rice stubble burning despite having so many subsidised technologies to choose from?

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With the rise in air pollution in Delhi-which city residents acknowledge has become worse over the last decade-farmers' burning practices have come under intense public scrutiny. This is despite the fact that a disproportionate share of the city's pollution is of its own making. In Haryana, bureaucrats unabashedly admit in front of farmers that they are under pressure to control burning for the sake of Delhi's air, and that farmers therefore need to stop. In a crisis mode of governance, where stopping burning becomes the priority rather than a well-thought-out chain of actions towards solving the underlying problems behind both Delhi's smog and large-scale burning, technological alternatives for residue management have been pushed through state subsidies combined with threats of punishment if farmers do not comply.

However, after several months of talking to farmers, shadowing an agtech (agricultural technology) startup, sitting down with bureaucrats in Haryana, and interviewing agricultural scientists, I concluded in papers recently published in the *Journal of Agrarian Change* and *Economic Anthropology* that the proposed alternatives are largely ineffective in practice. In this essay, I focus on one such technology to show how this plays out on ground. But before that, some historical background will be appropriate.

The Green Revolution's Legacy

The practice of stubble burning, rather than a mindless act, is a Green Revolution legacy. Since the 1960s, the enhancement of rice and wheat yields using industrial inputs has transformed cropping systems in states like Punjab and Haryana towards large-scale monocultures of these crops. A traveller crossing Haryana on her way from Delhi on the Grand Trunk Road can easily notice miles of standing rice crop, like a sea of green, in the month of September. While the visual looks attractive, it hides the fact that a disproportionate focus on productivity has been achieved at the cost of cutting off agricultural production from the socioecological relationships that historically sustained it. For instance, farmers in these states hardly consume rice themselves, and the traditional uses of rice straw have declined due to a reduction in livestock population and changing construction practices.

The short turnover time between rice and wheat for ensuring productivity, together with a shortage of manual labourers, has led to the widespread adoption of mechanical combine harvesters for harvesting rice. This period is sometimes shortened due to untimely rainfall, since mechanical harvesters cannot enter moist fields. According to a recent estimate, the number of combine harvesters used to harvesting monocropped rice in India increased to over 40,000 in 2020 from 800 in 1971. While manual harvesting cuts the plant near the soil, leaving a little stubble that easily decomposes, combine harvesters leave a large part of the plant (20-40 cm) and loose straw behind, which farmers have traditionally opted to burn. Moreover, the Haryana Preservation of Sub-soil Water Act of 2009 prevents farmers from transplanting paddy before 15 June "or such date as notified by the State Government", which further shrinks the window for rice harvesting. Farmers' burning of rice stubble is therefore a result of intense temporal pressure to earn their livelihoods, which is shaped by the socio-technical, legal, and ecological realities of the intensive rice-wheat cropping system, established since the Green Revolution.

Around 2020, the Delhi government of the day publicised the Pusa biodecomposer with much fanfare as a magical 10-rupee capsule to solve the burning problem. Developed by the Indian Agricultural Research Institute (IARI) in Delhi, and licensed to several private firms, this fungi-based microbial solution promised to accelerate the decomposition of rice stubble, thereby making burning unnecessary. A five-page report by the IARI, which reads more like a marketing document than a thorough analysis, claims that the solution was tested on 1,935 acres and that nearly 90% of farmers reported successful decomposition.

However, my fieldwork showed that the farmers were not convinced about the effectiveness of this solution, and for good reason. The effectiveness of the solution depended on environmental factors such as temperature and rainfall, an agricultural scientist from IARI told me. Decomposer fungi need an ideal temperature range (25-28°C) to multiply well. But a farm is not a laboratory. In an increasingly unpredictable climate, field conditions are harder to predict, let alone control. Sudden rainfall can wash away the sprayed microbial solution. These contingencies were not mentioned in the report and came up only after I asked about the lack of uptake among farmers and criticism from other scientists.

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When I asked the scientist what the reason behind this omission might be, the reply was: "Nobody talks about the negatives in the document."

These contingencies went unmentioned even at a state-organised workshop promoting the solutions to farmers, which I attended in Karnal in September 2022. A few bureaucrats also admitted they were forced to promote an ineffective technological solution under pressure from higher up. Farmers, in turn, under threat of fines and even imprisonment, respond based on their individual calculations shaped by their caste and class backgrounds.

The Pusa biodecomposer was also licensed by IARI to a few private companies, including an agribusiness-funded startup that scaled it rapidly across 400,000 acres, cultivated by nearly 25,000 farmers in its first season of implementation. The startup had converted the capsule-based biodecomposer, which required fermentation, into an instant powder form that farmers could dissolve in water and spray on standing stubble. Combined with mediation by a mobile application and an army of precarious, incentive-based gig workers to enrol farmers, the startup justified its approach in the name of urgently addressing the ongoing air pollution crisis. It did not conduct enough

trials after reformulating the biodecomposer because, as the company's chief technology officer told me, the company wanted to avoid losing the entire rice season merely in testing the formulation. The startup had by this time claimed success in its project report, based on satellite data that indicated burning had been prevented with a success rate of nearly 90%.

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However, the ground reality was completely different. The residue never decomposed in time for wheat sowing, and in many cases, farmers faced delays in sowing wheat. Remote sensing satellites detected the avoidance of burning, but in reality, farmers could not burn even if they wanted to, as the company required the stubble to be buried in soil after spraying the decomposer. Once the standing stubble was buried, there was no way farmers could burn it. Realising the harm done to farmers, the company quietly pulled its product from the market mid-season. It never contacted the farmers again. Yet it could register the acreage for carbon credits. Burning had, technically, been prevented because once farmers buried the stubble for decomposition, it could no longer be burned, even when the decomposition failed.

The crisis framing of climate change (and Delhi's air pollution), combined with the incentive to marketise sustainability using carbon credits by accounting for reductions in greenhouse gas emissions, offers these companies a justification to move fast and think about repercussions later. As a result of perverse incentives to capture the market-'blitzscaling' in startup-speak-it turned out that the farmers who used the startup's bio-decomposer in the first season refused to use it in the second year.

This failure of the start-up's 'sustainability' programme and the harm done to farmers and to the company's precarious gig workers who were enrolled in the process of scaling up its programme is structural, rather than being a one-off. In the name of addressing the climate crisis, hundreds of agriculture technology startups-mostly funded by or aspiring to be funded by venture capitalists-have emerged in the last decade. The venture-capital-driven Silicon Valley approach of 'move fast and break things', credited to Meta's Mark Zuckerberg, has been brought to Indian agriculture without much reflection on its suitability to a highly inequitable and ecologically dependent domain of agriculture (Meta itself, incidentally, has moved on from its founding motto).

These startups, led by engineering and management graduates from some of India's premier institutes, attempt technological solutions to complex socioeconomic and ecological issues. This reductive approach to complex environmental problems such as Delhi's air pollution and rice stubble burning, combined with the race for raising the next round of funding, results in harm to the very beneficiaries the tech-entrepreneurs promise or intend to help in the first place. In recognition of their nod to sustainability, which is important to highlight for acknowledging shared objectives and possible epistemological bridging, I call this *violent sustainability*.

Perceptive readers might notice that the term violent sustainability is an oxymoron. I use it to point out at least two inherent contradictions in sustainability as employed by our techno-managerial and financial do-gooders. First, even though they are well-intentioned and want to improve their programmes through grounded feedback, robust feedback loops are almost impossible to establish in a rapidly scaling programme, especially when those designing the programmes are geographically and socially miles apart from those at the receiving end.

Second, when they attempt to rapidly scale such programmes-which really is because venture capitalists would not have anything otherwise-they reduce the deeper socioecological relationships that underlie the idea of environment. In other words, you cannot pick and choose one part of a complex network of dependencies to solve for while ignoring the others.

This is not an argument against simplification, as everyone needs to do some of it to make sense of and intervene in the world. It is an argument against hasty decisions driven by the bottom line rather than a relational perspective on the issues involved. The recognition of entanglements, critical theorist Eva Haifa Giraud (2019) argues, should not result in inaction but should instead be considered an invitation to take responsibility for necessary exclusions by making them "visible and open to contestation" by those most impacted. Therefore, the question is not whether to pursue sustainability but how specific programmes are designed and placed in dense webs of relationships where they are implemented.

Technological Solutionism

The Pusa biodecomposer is now being replaced by a reformulated powder-based decomposer, with no peer-reviewed evidence of its effectiveness and no explanation for the switch. The original capsule was trialled on fewer than 2,000 acres; according to a Haryana

government press release of October 2025, its unproven successor has already been spread across 75,000 acres.

In an era of shrinking state support for farming, each new technology demonstrates state action and therefore serves a purpose, even when its effectiveness is unreliable. These decisions to hastily release a new technology without peer-reviewed evidence of its effectiveness reflect an ideological belief-described by social scientists as "technological solutionism"-that technologies at our disposal are so powerful that it is deemed unwise not to act immediately, even in the face of uncertainty.

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Farmers are forced to try these technologies under threat of punitive action and are left to bear the brunt of the solution's ineffectiveness, unless another solution is presented as more effective than the earlier version. Those with limited risk-bearing capacity who are already facing the brunt of ecological and economic consequences of industrialised agriculture, such as smallholders and tenants, are doubly affected. They are forced to bear risks of alternative stubble management while also spending scarce resources on uncertain solutions. The current compensation of Rs 1,200 per acre is inadequate given the risks involved.

That farmers are being singled out for Delhi's pollution woes is not surprising for those who take history seriously. The environmental anthropologist Amita Baviskar (2020) reminds us that even during 1993-94-before the introduction of cleaner CNG-based public transport-when 64% of the city's air pollution came from motor vehicles and only 12% from industrial sources, small factories that provided jobs to workers were disproportionately blamed. Many were shut down or relocated following judicial orders, disproportionately affecting those who would arguably be the worst victims of the crisis themselves, living in closely spaced slums and shanties without air conditioners and purifiers to ward off toxic air.

Large-scale stubble burning is one of the many negative by-products of a focus on industrialising agriculture. Excessive chemical usage, poor nutrient quality of products, groundwater overexploitation, and soil salinisation are some others. These ecological consequences have solidified the demand for diversification toward alternative crops such as maize and sunflower, but the efforts have remained limited. Our agricultural universities are still focussed disproportionately on researching rice and wheat, fuelled by long-discredited Malthusian fears of food scarcity. Even when alternatives such as natural farming are proposed, as was done during the Karnal workshop, they are incorporated within a solutionist register rather than producing a shift towards agroecological principles, ultimately reinforcing the dominant solutionist paradigm.

Proponents of crop residue management have an explanation for the low uptake: farmers, they suggest, are simply unwilling to invest in alternatives despite state support. It is an old stereotype of the traditional, backward cultivator put forth as a diagnosis. But, as my research shows, it is the credentialed scientists and officials who have questions to answer about untested formulations, unmentioned contingencies, and reports that read like advertisements. And the annual outrage ignores the fact that even on peak burning days, stubble fires account for only 30-35% of Delhi's pollution.

The belief that technological solutions, implemented rapidly and at scale, would somehow address these problems ignores both the fundamental drivers of environmental crises and the entrenched social, political, and economic interests behind them. Or worse, the proposed solutions hit the already marginalised the hardest. Delhi's air crisis cannot be resolved through interventions targeting stubble burning as long as the city's own pollution sources such as vehicular emissions remain under-examined. Likewise, stubble burning itself is the result of an intensive rice-wheat cropping system. If the state continues to govern only the effects-stubble and smog-rather than their structural causes, it merely displaces responsibility rather than resolving either of the two problems. Stop every fire this winter, and Delhi would still be gasping.

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References:

Baviskar, Amita (2020). *Uncivil City: Ecology, Equity and the Commons in Delhi*. Yoda Press.

Giraud, Eva Haifa (2019). *What Comes after Entanglement? Activism, Anthropocentrism, and an Ethics of Exclusion.* Duke University Press.