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CONVERSATIONS 2: Air Pollution

Can We Use Delhi's Air Pollution Crisis to Improve Agriculture?

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Last November, some 4,000 schools closed due to a pernicious fog that covered Delhi and all modes of transportation into Delhi were affected. As my partners in this Conversation identify, this regular winter phenomenon is a result of many different factors. However, one source of pollution—rice straw burning in the Indo-Gangetic plains—emerges as a particularly significant problem during the winter. Nearly a third of the concentration of small dust particles in Delhi in the winter months is attributable to biomass burning (Sharma and Dixit 2016).

The Indo-Gangetic plains, covering some 10.5 million hectares, represent India's bread basket (National Academy of Agricultural Sciences 2017). The green revolution, with its new farming practices, transformed agriculture—for instance, Punjab, a state that covers less that 2% of the country's land, is now thriving while growing nearly one-third of India's total rice and wheat (Mann 2017). However, recent years have seen a decline in agricultural productivity, partly because of changes in climate and water.

Given the continued reduction in water availability, the government of Punjab requires farmers to match their rice-planting season with the arrival of monsoonal rains. The time available between the harvest of rice and sowing of wheat is enormously limited. Thus, when it is time to clear their fields of rice straw to plant wheat, farmers simply light a match. Coarse rice has high silica content, which is why farmers do not feed it to livestock. Further, only seven electricity plants use rice straw for generating 62.5 MW

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of electricity. Punjab and its northwestern neighbouring states produce some 34 million tons of rice residue per year, nearly 70 per cent of which is burned; Punjab contributes about 65 per cent of the residue (NAAS 2017). In Punjab, the health costs associated with bad air from straw burning are estimated to be some Rs 76 million per year, or Rs 3 per ton of rice residue produced (Kumar et al. 2015). The smoke-filled air also spreads out into Delhi's airshed, adding to its already high levels of air pollution (Liu *et al.* 2017).

A series of agricultural machines developed over the past decade offer a promising solution to the straw-burning challenge. In the rice–wheat system, a combine harvester with a super straw management system (SMS) can harvest rice and distribute the straw, while the Happy Seeder drills holes into the ground to seed the wheat. This form of conservation agriculture has economic returns that are comparable to other options and removes the need to burn straw (Gupta 2014; Sidhu *et al.* 2015). In addition to air pollution benefits, conservation agriculture using the Happy Seeder can potentially increase soil organic matter and reduce water use and greenhouse gas emission (National Academy of Agricultural Sciences 2017).

Conservation agriculture, however, is new to farmers. It will require information, training, and incentives to persuade farmers to change habitual practices and to convince local manufacturers and service providers to supply Happy Seeders at scale. Krishi Vigyan Kendras have already begun to demonstrate the use of no-burn technologies. Such demonstration and training may need to be expanded and their efficacy better understood. The central government recently announced a subsidy package of Rs 10 billion to help farmers to stop burning their straw fields. The government ban on burning, in combination with support for sustainable farming, may well lead to longer-term food security.

REFERENCES

Gupta, Ridhima. 2014. "Low-Hanging Fruit in Black Carbon Mitigation: Crop Residue Burning in South Asia." *Climate Change Economics (Singapore)* 5(4): 1-22 https://doi.org/10.1142/S2010007814500122

Kumar, Parmod, Surinder Kumar, and Laxmi Joshi. 2015. "Valuation of the Health Effects of Air Pollution from Agricultural Residue Burning." In *Socioeconomic and Environmental Implications of Agricultural Residue Burning: A Case Study of Punjab, India* edited by Parmod Kumar, Surinder Kumar, and Laxmi Joshi *Springer Briefs in Environmental Science*, 35–67. New Delhi: Springer. https://doi.org/10.1007/978-81-322-2014-5_3

Liu, Tianjia, Miriam E Marlier, Ruth S DeFries, Daniel M Westervelt, Karen R Xia, Arlene M Fiore, Loretta J Mickley, Daniel H Cusworth, and George Milly. 2017. "Seasonal Impact of Regional Outdoor Biomass Burning on Air Pollution in Three Indian Cities: Delhi, Bengaluru, and Pune." *Atmospheric Environment* 172: 83–92. https://doi.org/10.1016/j.atmosenv.2017.10.024

Mann, R S. 2017. "Cropping Pattern in Punjab (1966–67 to 2014–15)." *Economic and Political Weekly* 52(3): 30–33.

National Academy of Agricultural Sciences. 2017. *Innovative Viable Solution to Rice Residue Burning in Rice-Wheat Cropping System through Concurrent Use of Super Straw Management System-fitted Combines and Turbo Happy Seeder.* Policy Brief No. 2. New Delhi: National Academy of Agricultural Sciences.

Sharma, Mukesh and Onkar Dikshit. 2016. "Comprehensive Study on Air Pollution and Green House Gases (GHGs) in Delhi (Final Report: Air Pollution component)." Submitted to Department of Environment Government of National Capital Territory of Delhi and Delhi Pollution Control Committee, Delhi. http://delhi.gov.in/DoIT/Environment/PDFs/Final_Report.pdf

Sidhu, H S, Manpreet Singh, Yadvinder Singh, J Blackwell, Shiv Kumar Lohan, E Humphreys, M L Jat, Vicky Singh, and Sarbjeet Singh. 2015. "Development and Evaluation of the Turbo Happy Seeder for Sowing Wheat into Heavy Rice Residues in NW India." *Field Crops Research* 184: 201–12. https://doi.org/10.1016/j.fcr.2015.07.025