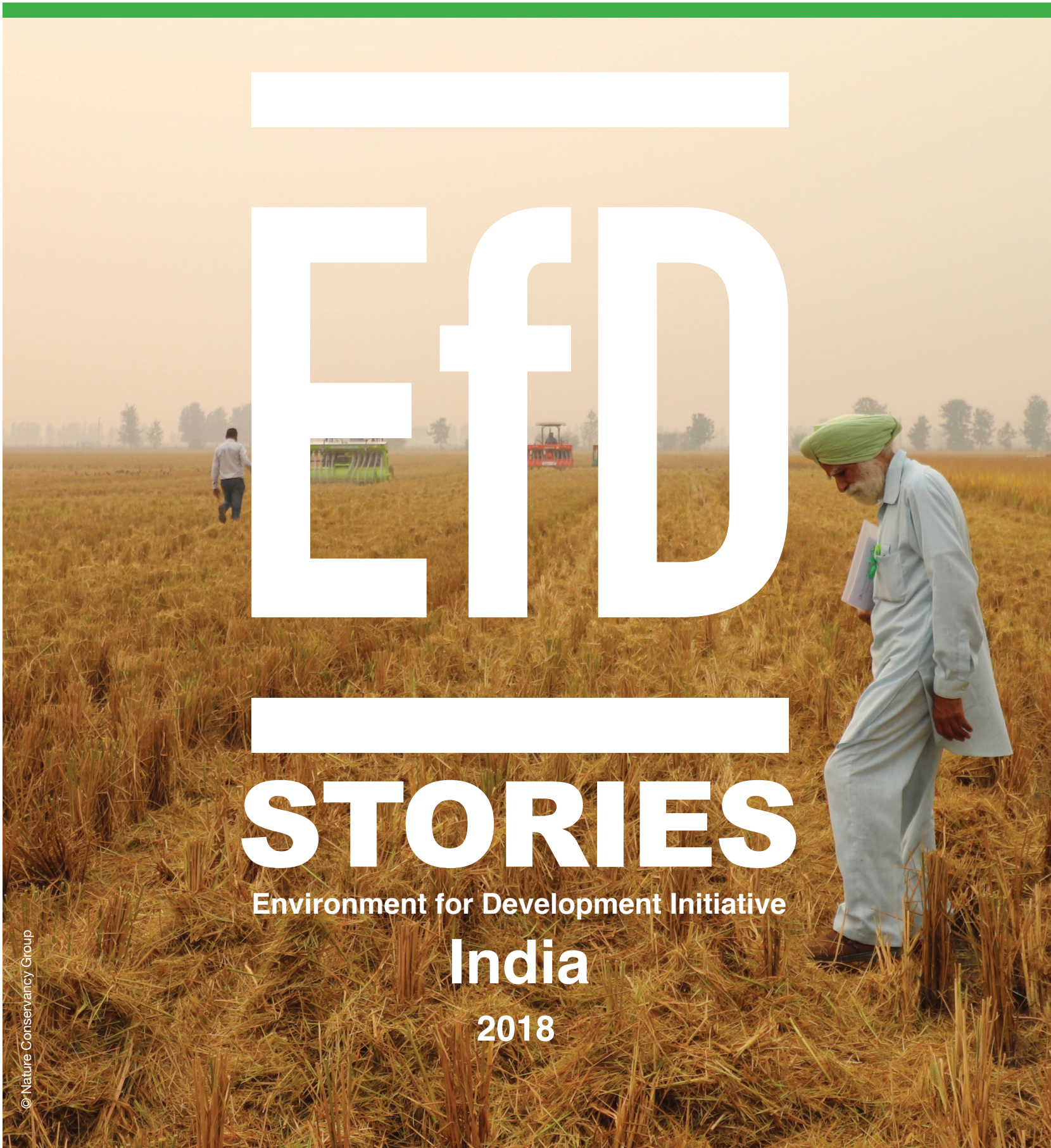
Evaluating a ‘happy’ solution to India’s crop residue burning



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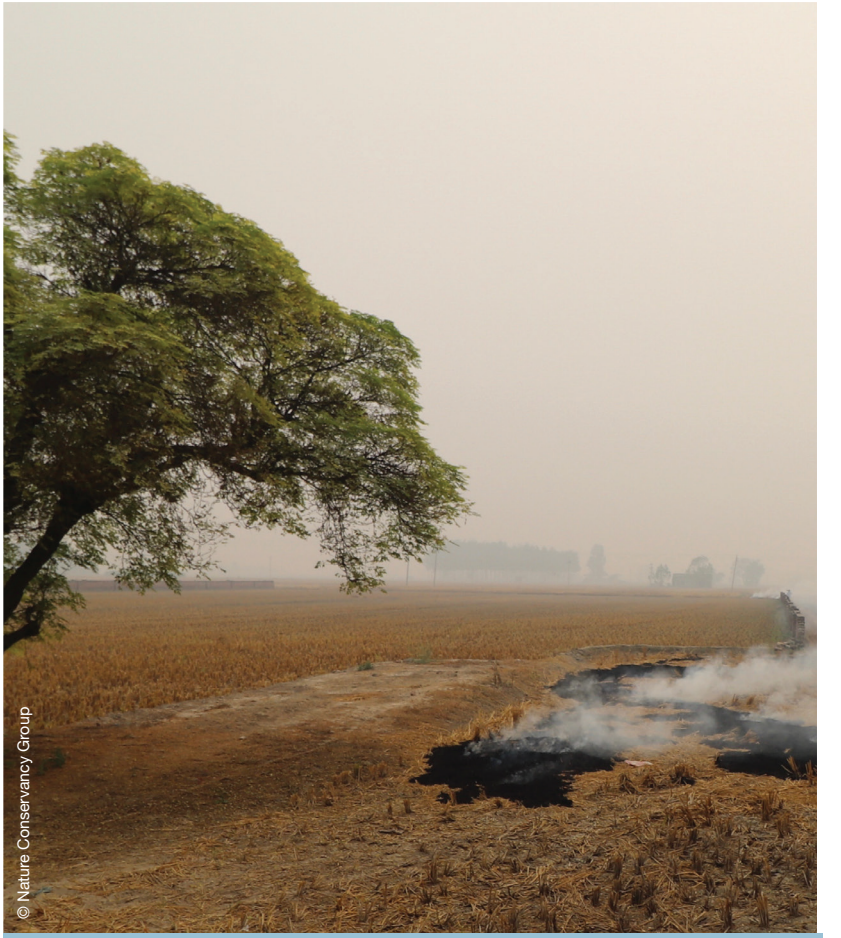
by Ishita Datta

At the end of every rice-growing season in north-west India, usually in mid-November, farmers harvest their crop using combine harvesters. Most farmers then burn the left-over rice straw out in the fields to make way for planting wheat, which is the season's next crop, as there is a short window to harvest rice, dispose of rice residues, and plant the subsequent wheat crop. But burning crop residue in this way is one of the major causes of air pollution in Punjab, Haryana, Delhi and eastern Uttar Pradesh, causing an annual seasonal surge in black carbon emissions.

The Indian government has tried a number of ways to tackle this form of air pollution through policy measures, enforcement of a mandatory ban on the burning of agricultural waste, financial incentives, and technological interventions.

Researchers from the Centre for Research on the Economics of Climate, Food, Energy and Environment (CECFEE) at the Economics and Planning Unit in the Indian Statistical Institute in New Delhi recently decided to take a closer look at one particular innovation – a device called the 'Happy Seeder' – to see if farmers in north-west India were adopting this technology. The researchers wanted to understand how the use of the Happy Seeder impacts crop yield, as well as the cost effectiveness of the technology, and whether it helps address the problem of black carbon pollution in the affected areas.

The Happy Seeder is a technology that gives farmers a less polluting alternative to deal with their rice crop residue, without compromising their wheat harvests. The device is a tractor-mounted machine that cuts and lifts the rice straw that is left behind after harvesting. It then sows wheat into the bare soil, and deposits the straw over the sown area as mulch. In 2010, economist Dr Ridhima Gupta surveyed 92 farmers across the regions in question, to assess which farmers were using the machine, and what their experiences were.



Burning crop residue is one of the biggest contributors to black carbon air pollution in north-west India.

The first finding was that, in terms of yield, there was no significant difference in the quantity of wheat output after sowing with the Happy Seeder, compared with adjacent fields where farmers used conventional seed sowing methods.
In terms of the cost of preparing fields for sowing

the wheat, using the Happy Seeder was marginally cheaper: field preparation cost US$ 95,76 per hectare with the Happy Seeder, while it was US$ 112,11 per hectare using conventional methods. Farmers were saving, on average, US$ 16,35 per hectare by cultivating plots with the Happy Seeder. The per-hectare profit from wheat using the Happy Seeder was US$ 7,69. However, Gupta's finding is that this is not enough of a financial incentive to encourage farmers to adopt the technology. The state should therefore consider other legislative measures, such as making the technology compulsory, or find other ways to incentivise farmers to adopt the Happy Seeder.

While the Indian government has banned the burning of crop residue, this policy is largely ineffective because most farmers are unaware that there are cost-effective alternatives available to them.
The state subsidises one-third of the purchase price of the Happy Seeder machine, which currently sells for US$ 1999,73. Following her research, Gupta now argues that this subsidy should increase to 50 percent, as this will give greater incentives for farmers to adopt the technology and boost their profits compared with conventional practices. It will therefore increase demand for the product, which will further drive down the cost per unit.

At the time of the 2010 study, only a handful of farmers were using this machine, but now more than 3000 farmers have adopted it. The CECFEE researcher anticipates that farmers will adopt the technology even more quickly in the future if the right incentives are in place along with greater awareness.

The fact that there is a thriving rental market for the machines in north-west India also suggests that farmers are willing to adopt the technology once a significant number of them owns the machines.

Gupta recently presented her findings to the Indian Ministry of Environment, Forest and Climate Change (MoEF&CC), to make recommendations for how the state can address the issue of air pollution related to crop residue burning. She recommended a two-pronged approach: first, an assortment of policy interventions, including stronger enforcement to stop crop residue burning. The second is to create greater awareness of the available alternative practices using technologies like the Happy Seeder, and support this through state incentives such as a greater subsidy for the machine. These approaches in combination may accelerate the uptake of such technologies.

Currently, CECFEE researchers Prof Eshwaran Somanathan and Dr PP Krishnapriya are collaborating with a United States-based conservation group, The Nature Conservancy (TNC), to mobilise policy in this direction. In a workshop conducted by TNC in Jaipur, India, in November 2017, they presented an evaluation of the Happy Seeder, and India's National Academy of Agricultural Sciences (NAAS) recommended the Happy Seeder as a 'holistic solution' to the air pollution problem due to crop residue burning.

Later in 2018, the CECFEE plans to engage with relevant government officials in Delhi around these findings, with the intention of meeting in a workshop where they will aim to draw up relevant policies in this regard.

The CECFEE is a member of the Environment for Development (EfD) initiative, a network of environmental economists based in Sweden, with centres in various developing countries.

Researchers involved

Eshwaran Somanathan, and PP Krishnapriya.

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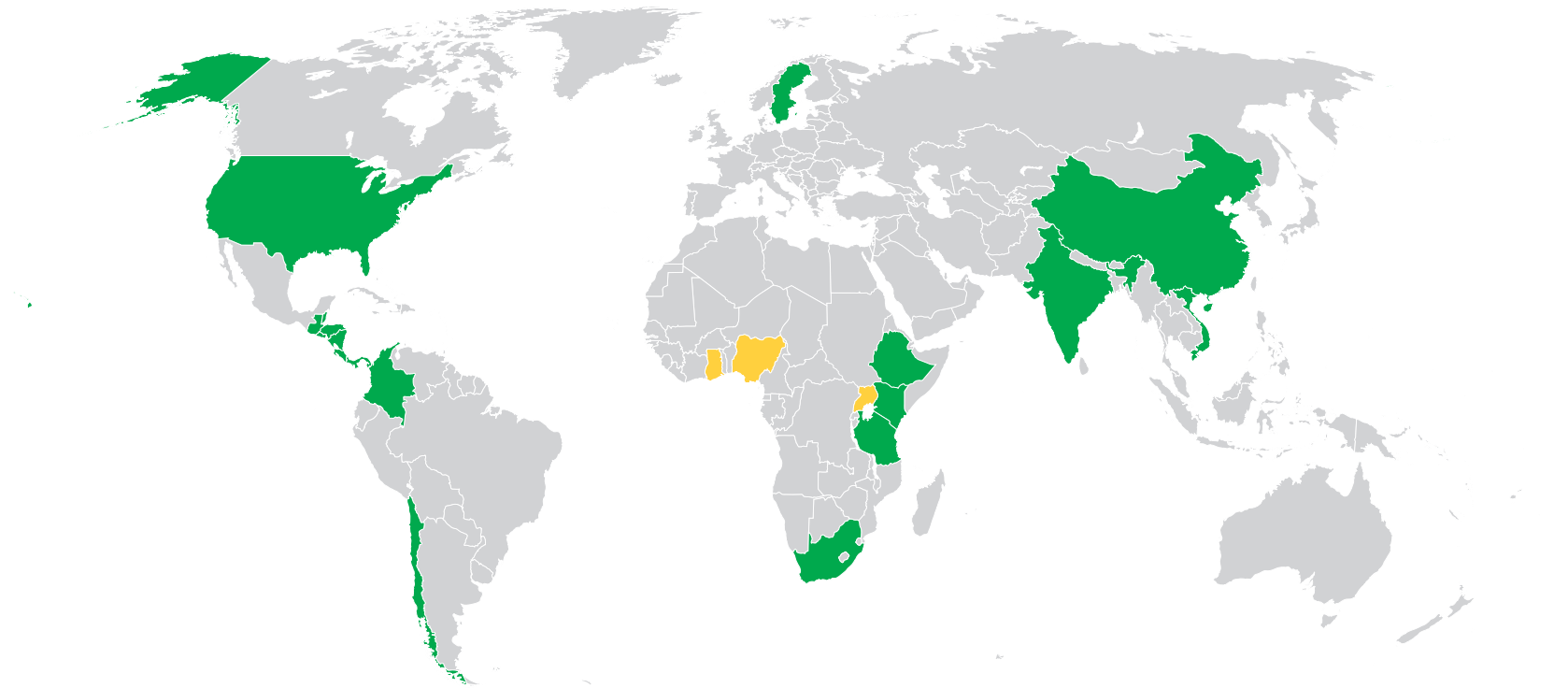

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