

# How farmers can stop burning crop stubble & profit from it too

Ahead Of Winter Sowing Season, Which Brings The Threat Of Air Quality Worsening Due To Crop Burning, A New Study Says Green Solutions Give Up To 20% Higher Returns

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Farmers make headlines in north India every year in October-November, when millions of acres of burning fields contribute to an 'airpocalypse' that chokes the region. Yet, the hazardous practice of stubble-burning continues mainly because a majority of farmers believe it's the cheapest option they have to clear their fields for the winter crop. But, is it?

A study published in the journal Science on Friday shows that alternatives such as the use of Happy Seeder along with straw management systems can actually give farmers up to 20% higher returns than the most common method that involves burning stubble. Happy Seeder is a tractor-mounted implement, developed at Punjab Agricultural University, Ludhiana, that can sow seeds in fields where stubble from the previous crop hasn't been removed. The straw acts as mulch, retaining moisture in soil and providing nutrients to future crops.

Most farmers growing rice and wheat in north India prepare their fields for the wheat crop in October-November by burning the stubble left after the rice crop has been harvested, ploughing the field and sowing wheat using conventional seeders. The study — Fields On Fire: Alternatives To Crop Residue Burning In India — compared 10 common alternatives used by farmers, three of which involve residue burning.

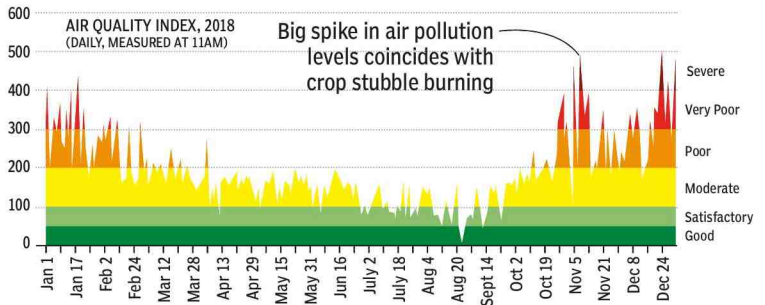
The authors evaluated the public and private costs as well as the benefits and potential scalability of each method. They found that methods based on use of Happy Seeders gave on average 10% higher returns than the burning option (with zero-till seeders) and were around 20% more profitable than the most common method that involves burning the crop residue and using conventional seeders (see graphic).

The study said the higher profits from methods using Happy Seeder came from both slightly better yields and lower input costs. Baling, another alternative to burning in which the crop residue is packed into bales by machines for sale as fuel, was not found to be as profitable. Another method, incorporation of residues into the soil, offered the lowest average returns.

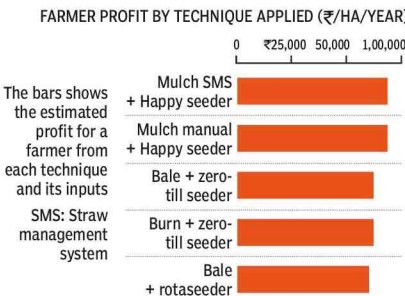
The authors — who include scientists from The Nature Conservancy, the International Maize and Wheat Improvement Center (CIMMYT), Indian Council of Agricultural Research (ICAR), the Borlaug Institute for South Asia (BISA) and the University of Minnesota — relied on data from peer-reviewed experimental field trials, farmer field trials, farm household surveys, government data and primary datasets, all from Punjab and Haryana, the two states where most burning takes place.

## HAPPY SEEDER A WIN-WIN SOLUTION, BUT NEEDS TO BE POPULARISED

1 Delhi's air quality in November, which coincides with stubble-burning season, is worst in the year



2 Use of Happy Seeders avoids stubble-burning and gives better returns to farmers



### ASTRONOMICAL WASTE

23 million tonnes of rice residue was burnt in north India in 2017

► If packed into 20-kg, 38-cm-high bales and piled on top of each other, that mass of straw would be over **4,30,000 km high** — about 1.1 times the distance to the Moon

3 Yet, the technology still isn't widely applied by farmers

94% of Punjab, Haryana farmers aware of Happy Seeder

86% have seen it in action or know how it works

### ...BUT

11% of farmers use Happy Seeders

1% provide Happy Seeder services to others

14% farmers know others using Happy Seeder within their trusted networks

2% know someone who provides Happy Seeder services within their top 3 agricultural contacts

Source: AQI from US Embassy, New Delhi; other data from paper in Science — Fields On Fire: Alternatives To Crop Residue Burning In India

The findings tie in well with the Centre's Rs 1,151-crore package, announced last year, to promote in-situ management of crop residue (through use of Happy Seeders and other methods that leave the stubble in the field) in Punjab, Haryana, UP and Delhi. As a result of the Centre's subsidy, Happy Seeder sales shot up to an estimated 10,000 last year; a 10-fold increase from 1,000 seeders sold in 2017. Trilochan Mohapatra, DG of ICAR, said use of Happy Seeder/zero tillage technology spread to 8 lakh hectares in north India last year following the Centre's package.

"Considering the findings of the Science article as well as reports from thousands of trials, our efforts have resulted

in an additional direct farmer benefit of \$131 million, compared to a burning option," Mohapatra said in a statement.

Yet, the study points out that much more needs to be done to end crop burning. Its survey of farmers, done in 2017, showed that while most knew about the Happy Seeder, relatively few (around 11%) had used it. The in situ techniques, in which straw is left on the soil as mulch, have other advantages, said ML Jat, principal scientist at CIMMYT and a co-author of the study. "These methods help capture and retain moisture, reducing the need for watering, and also improve soil quality. Crops grown under these techniques are more resilient to climate stresses," he said.