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Tobacco Curing and Fuel Efficiency in Karnataka, India

The state of Karnataka in India produces some of the best Flue Cured Virginia (FCV) Tobacco in the world, much of which is cured with fuelwood. This large-scale use of fuelwood is causing widespread deforestation and associated environmental degradation in the state. In order to help find a solution to this challenge, a new SANDEE study has looked at the economic feasibility of reducing the use of fuelwood in the curing of tobacco leaves.

The study is the work of Nayanatara S. Nayak from Centre for Multi-Disciplinary Development Research. Nayak finds that there is some scope for reducing fuelwood use by using energy-efficient technologies such as Venturi furnaces and barn insulation. Not only would these technologies reduce pollution and save energy but they would also bring down the cost of curing tobacco. If all fuelwood-using tobacco farmers adopted the two fuel-saving technologies, 12% less fuelwood would be used. The study therefore recommends that agricultural extension services should provide better information to farmers on these fuel-efficient technologies and promote their adoption.

In Karnataka, FCV tobacco is grown as a kharif (rainy –season) crop during the months of May-September in the districts of Hassan and Mysore. These two districts contribute around 97% of the total tobacco production in the state and account for about 5% of the world's traded high-quality tobacco. In Karnataka, tobacco curing is carried out during the months of September and October through 56,514 registered tobacco curing barns. (For more information on tobacco cultivation and curing in India see the side bar.)

The fuelwood challenge

The problems associated with the use of fuelwood to cure tobacco are not limited to Pakistan. For example, research suggests that 30% of deforestation in Bangladesh may be related to tobacco manufacturing. However, despite widespread concerns regarding the use of fuelwood for tobacco curing, few studies have studied the feasibility of alternatives. This study was therefore conducted to help fill this information gap.

Nayak set out to see what alternatives to fuelwood-based tobacco curing exist and what the costs of using such alternatives are. She also assessed whether fuel-efficient technologies are profitable for farmers and looked at the long-term impacts of tobacco farming on deforestation and food security.

FCV Tobacco Field in Karnataka

This policy brief is based on SANDEE working paper No. 77-13. 'Tobacco Curing and Fuel Efficiency in Karnataka, India' by Nayanatara S. Nayak, South Asian Network for Development and Environmental Economics (SANDEE), PO Box 8975, EPC 1056, Kathmandu, Nepal. Email: nsnayantara@yahoo.com. The full report is available at: www.sandeeonline.org

Tobacco cultivation and curing in India

India produced some 725 million kg of tobacco in 2009-10. This means that its share of global tobacco production stands at approximately 9%. In 2009-10, tobacco production constituted around 10% of the national government's exchequer through excise revenues and 4% of India's earnings from the export of agricultural and allied products. In addition to FCV or cigarette tobacco, India also produces Bidi tobacco, which is considered the poor person's tobacco.

Different methods are adopted for tobacco curing, which is the process employed to dry tobacco leaves. FCV tobacco is cured in barns by hanging the leaves from poles inside the barn. The leaves are left to dry for two to three days. After drying, farmers grade the leaves according to texture and color and pack them into bundles. The barns used for curing generally have a floor fitted with cylindrical flue pipes and a furnace attached to the opening of the pipes. This forms a combustion chamber that extends through the walls of the barn. Heat is generated by lighting the furnace with a fuel source outside the barn, which then spreads through the pipes into the barn.

In India, fuel wood and coal are the fuel sources that farmers have traditionally used to flue cure FCV tobacco. However, in the last few years, farmers have resorted to other non-wood biomass such as coffee husk, coffee root, coconut husk/fronds/shells, maize pods, paddy husk, groundnut shells, cashew kernels, orange tree roots and wood chips.

In recent years, several techniques for improving fuel efficiency have been promoted. One of these is the installation of the Venturi furnace. However, to date, only a few farmers have adopted this technology. Most farmers in contrast have barns with traditional furnaces. These have small air vents and suffer from the incomplete burning of fuel and a high degree of charcoal formation. In a Venturi furnace, in contrast, there is little deposition of filth inside the flue pipe as there is provision for fly ash to collect in an ash pit. Another fuel-efficient technique used is insulation. Roofs are insulated with thermacole or straw from crops such as paddy, maize and sugarcane to retain the heat. Tobacco farmers can adopt both modern technologies simultaneously.

Collecting information for the study

In order to understand how farmers cure their tobacco, Nayak carried out a survey of 610 tobacco-growing households or 1.5% of the registered FCV tobacco growers in Karnataka. Her survey collected information on land holdings, the ownership of barns and the area under tobacco and other crops. She also collected data on the cost of curing tobacco (including input, labor and transportation costs), the types of energy sources used for curing, the types of improved technology adopted for curing and the places where fuel was sourced from. Farmers were also asked about their reasons for using their chosen energy sources. In addition, discussions were held with local biomass suppliers at the village level, and secondary information was collected from the Tobacco Board, the Forest Department and the Central Tobacco Research Institute.

Nayak also examined the potential impact of fuelwood use on deforestation and forest degradation and the links between new fuelwood plantations and reductions in paddy production. In order to gauge the costs of alternate fuels, Nayak used a simple cost accounting method that estimated and compared average curing costs.

The use of fuelwood in Karnataka

A majority of the farmers (70%) sampled for the study cure their tobacco using fuelwood. About 16% of farmers used coffee husks as fuel. Although private suppliers identified nearby plantations as the main source of the firewood used for curing, the cleaners and drivers of supply vehicles suggested that illegal cuttings from forests were often mixed into such loads.

One of the reasons why farmers preferred fuelwood was that it was easily available locally (to 57% of the users), while coffee husk was accessible to only 36% of the users in the local market. It should be noted that though tobacco growers are urged by the Tobacco Board and Central Tobacco Research Institute (CTRI) to develop their own fuel plantations, they are not inclined to do this as the earnings from tobacco crops are higher than those from wood plantations.

Alternative technologies for tobacco curing

Two popular alternative technologies used to improve the fuel-efficiency of tobacco curing are the Venturi furnace and barn insulation. Since the mid-70s, many tobacco farmers (generally marginal and small farmers with less than 2.5 ha of land) received subsidies (now discontinued) from the Tobacco Board to help them implement both alternatives. Nayak found that some 18% of barn owners had insulated barns while 7.3% used a Venturi furnace. An additional 5% (approximately) of farmers used both barn insulation and a Venturi furnace.

Nayak's analyses suggests that the new technologies improve the efficiency of the tobacco curing process: The insulation of barns reduces the use of fuelwood by 10% and coffee husk use by 17%. Similarly, adopting a Venturi furnace reduces the use of fuelwood by 7% and coffee husk by 21%. Tobacco curing in Karnataka requires nearly 700,000 tons of fuelwood every year. If all fuelwood-using tobacco farmers adopted the two fuel-saving technologies, 12% less fuelwood would be used.

The impact of fuelwood use on food security

With respect to food security, an average 8.5 tons of paddy (the main crop in the region) are foregone to produce 35 tons of fuelwood per hectare per year in villages where paddy is replaced by plantations. However, forest plantations are more profitable than paddy by approximately 21%. While forest plantations are more risky than paddy, the significantly higher returns suggest that there will continue to be some substitution of paddy by plantations in years to come.

The production of FCV tobacco in Karnataka increased by 32% between the 2007-08 and 2009-10 periods. In the long run, if fuelwood plantations continue to increase to meet this type of demand, there may be a threat to food security due to the replacement of food crops by plantations, the loss of fodder for animals and the loss of soil moisture due to the increase in water-exhausting species such as Eucalyptus.

The cost effectiveness of alternative technology options

In Nayak's study area, the average cost of curing tobacco using fuelwood was INR 23 per kg of tobacco cured. For tobacco cured using coffee husk the cost was INR 21 per kg. This means that the use of fuelwood is some 10% more costly than the use of coffee husk. The study also found that the costs of curing are lower when farmers use alternate technologies. The average cost of fuelwood-based curing with insulated barns stands at INR 21 per kg of tobacco cured and at INR 20 per kg for Venturi furnaces. These costs are significantly lower than the fuelwood curing costs using traditional technologies. Similarly, on average, the costs of coffee-husk-based curing with insulated barns is 18% less and with Venturi furnaces 21% less than the cost of coffee-husk-based curing using traditional technologies.

Table: Cost-Benefit Analyses of Improved Technologies (without subsidy)

(in INR) [Rate of Interest-12 percent]

S. No.	Details	Marginal & Small Farmers		Medium & Large Farmers	
		Fuelwood	Coffee Husk	Fuelwood	Coffee Husk
Insulated Barn & Venturi Furnace					
1.	Costs (initial cost of installation of barn insulation and Venturi furnace)	10018.00	10018.00	10018.00	10018.00
2.	Discounted Benefits from Fuel Savings (projected cash flows over 10 years accrued by deducting annual maintenance costs)	25,996.00	69,577.00	77,250.00	140,006.00
3.	NPV	15,978.00	59,559.00	67,232.00	129,988.00

*NPV with subsidy amounts of INR 1406

FCV Tobacco Curing Barn

An interesting result is that large farmers, who can benefit from economies of scale, can recoup any investments made in fuel-efficient technologies within two to three years. Small farmers require a little over twice that amount of time. Overall, that the net present value of adopting fuel-saving technologies is positive in most cases, except in the case of small farmers using fuelwood, who would require a subsidy to insulate their barns.

Why don't farmers use the new technology?

Given the potential cost savings that the new technology can bring and the relatively short pay-back times, Nayak looked at the factors that were stopping farmers from installing Venturi furnaces and insulating their barns. She also looked at what factors were stopping farmers using coffee husk as fuel.

She found that, while farmers incur higher costs using fuel wood, they prefer this fuel because it is easily available and easier to store and does not require any modification in traditionally-used technologies. Farmers also cited a lack of awareness about fuel efficiency, the

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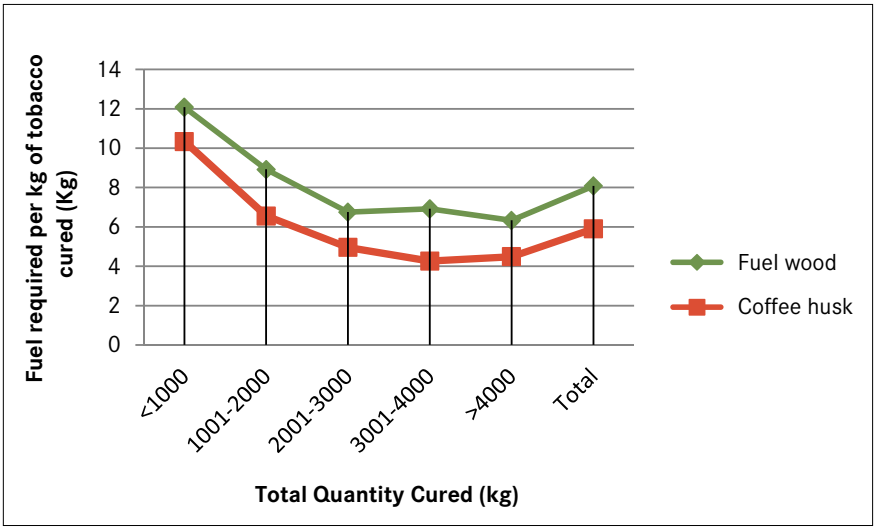
In tobacco curing, fuel-efficiency increases with the scale of curing.



non-availability of technical guidance and poor marketing of products at the village level as the main factors that stopped them adopting new technology. Furthermore, many farmers expected the government to give them a subsidy in the future and so did not wish to incur 100% of the expenses of any new technology.

Since, at present, farmers are not adopting fuel-efficient technologies to the extent that they could be, the Tobacco Board could play a bigger role in promoting coffee husk use and energy-saving technologies. Since many farmers also appeared unaware of and uninformed about fuel savings from the new technologies, the Board could better organize the market and extension services in order to increase awareness of these more energy-efficient options.

Planting plantations on waste ground and battling deforestation

Field data shows that a very small percentage of the wood used for curing is collected from forest depots with the rest coming from private plantations and, possibly, natural forests. Thus fuelwood plantations, which are very profitable, could be encouraged, particularly on wastelands. Research has estimated that some 127,769 hectares of waste land in Karnataka could be used for energy plantations. This wasteland could serve as an alternate source of land for fuelwood plantations. The study therefore recommends the promotion of plantations on waste lands in order to minimize any encroachment on paddy lands. However, it also highlights the need for more research into the feasibility of using wastelands for energy production.

The Forest Department of Karnataka is legally empowered to sell fuelwood through its forest depots on the assumption that mature stands are harvested and that afforestation programs are simultaneously put in place to increase forest cover. However, the Forest Survey of India (2009-10) report shows a 10% decline in forest cover in Karnataka between the years 2005 and 2009. The study therefore highlights the need for more research to better understand the root cause of this documented decline and to investigate the extent to which it is linked to tobacco curing.

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