

Fuel Consumption Study in Indian FCV Tobacco Value Chain

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Abstract – Tobacco is an important commercial crop grown in India. India occupies third position in tobacco production in the world with an annual production of about 840 Million Kgs. Based on the curing practices, tobacco is generally classified as FCV (Flue cured Virginia) and Non-FCV. Among various types of tobacco grown in India, flue-cured Virginia (FCV) tobacco accounts for only 190 Million Kgs and the rest of the tobacco is non flue cured. FCV tobacco is the only agricultural crop which is highly regulated by Tobacco Board (an autonomous organization under the Ministry of Commerce) and subjected to stringent restrictions on extent of area planted, quantity of tobacco produced and cured. Production of FCV tobacco in excess of authorized limits, without registration from Tobacco Board and not following sustainable practices is subject to levy of heavy penalties and cancellation of license deterring the farmers from doing so. FCV tobacco requires fuel for curing and the study was conducted to find out the complete value chain of fuel used for curing FCV tobacco. The study covered all the FCV growing districts in Andhra Pradesh and Karnataka and the focus was on understanding the fuel requirement and consumption pattern. Tobacco grower's survey, fuel supplier's survey and focused group discussions were conducted to find the results of the planned study. The study reveals that the average Specific Fuel Consumption (SFC) or quantity of fuel (in Kg) required to cure 1 Kg of tobacco across the region is 4.5. The variation in SFC among districts surveyed was found very less. The study also found the sustainable sourcing of fuel for curing of tobacco is demonstrated due to every year plantation from farming community and usage of alternative fuel (viz., *Prosopis juliflora* weed, Coconut fronds, Carpentry waste, Coffee stem etc.) accounts for 63%, Eucalyptus (10%), Acacia (9%) and the rest approx. 18% are the other fuels. Further, the study also revealed a strong fact that there is "no deforestation" due to tobacco curing in India. No natural wood or timber wood or forest wood is used in tobacco curing in both the FCV growing states of Andhra Pradesh and Karnataka [1].

Index Terms— Indian Tobacco Curing, No Deforestation, Fuel in Tobacco, Wood.

I. INTRODUCTION

Flue Cured Virginia tobacco is the principal type and an important commercial crop grown in India in the states of Andhra Pradesh and Karnataka under varied agro-climatic conditions. The crop is grown under rain fed condition in Mysore, Hassan, Prakasam and Nellore districts and under

irrigated conditions using modern technologies like drip irrigation in West Godavari district which uses less water. The curing of FCV tobacco is a process followed to remove the moisture from the leaves and bring chemical and physical change to the product. Based on the curing practice, tobacco is generally classified as FCV (Flue cured Virginia) and Non-FCV. FCV tobacco requires fuel for curing purpose, while Non-FCV tobacco are generally sun-cured or air-cured. Curing of FCV tobacco is carried out in an additional structure called barns. Different types of fuels are used for the curing process like *Prosopis Julifera* weed, Coffee husk, Biomass briquettes, Eucalyptus roots, Farm waste, etc., and fuel from commercial farmer own plantations like Eucalyptus, Acacia, Casuarina, Subabul etc. The production of flue-cured Virginia (FCV) tobacco is about 190 Million Kgs [2] among the total tobacco production of 840 Million Kgs.

The current study was planned to find the exact fuel consumption in FCV tobacco and to find the complete value chain of the required fuel for curing tobacco. Below are the objectives of the study:

- To estimate the fuel consumption for tobacco cultivation in all FCV tobacco growing regions.
- Understanding the value chain of fuel supply during curing season. Mapping of the supply chain of the fuel to assess the source.
- To assess the composition of fuel used in tobacco curing.

II. METHODOLOGY

The following methodology was adopted across a sample size of 230 villages covering 30 Tobacco Auction Platforms (TAP) in Karnataka and Andhra:

1) Tobacco Growers' Survey:

A total of 3,358 growers were surveyed in the 3 districts of Andhra Pradesh (Prakasam, Nellore, West Godavari) and 2 districts of Karnataka (Mysore, Hassan). The sample was further redistributed proportionately across the various soil types. A two stage sampling process was adopted – at the first stage village were selected and in the second stage the farmers were selected randomly [3]. The details of the sample size is given below:

Region	Total Farmers
Mysore	1,559
Hassan	244
Prakasam	940
Nellore	116
West Godavari	499
Karnataka	1,803
Andhra	1,555
Total	3,358

2) Fuel Suppliers' Survey:

A total of 441 Suppliers of fuel wood were also surveyed to map the supply chain of fuel from sources within from the neighboring state or to the barn using snowballing technique during the growers' survey.

Region	Total Farmers
Mysore	130
Hassan	47
Prakasam	170
Nellore	21
West Godavari	73
Karnataka	117
Andhra	264
Total	441

3) Focused Group Discussions (FGDs):

30 FGDs were conducted (one each in the 30 TAPs) to probe the knowledge of farmers on fuel consumption practices and adoption of technologies to reduce the fuel consumption and to understand the source of fuel.

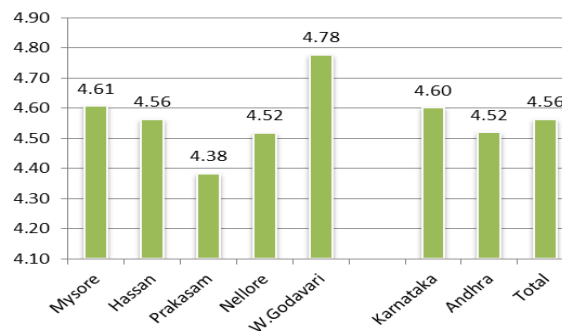
III. RESULTS & DISCUSSION

The results of the current study is detailed under the following heads:

- 1) Fuel consumption practices
- 2) Fuel wood supply chain

1. Fuel consumption practices: The fuel consumption practice is explained with the understandings of specific fuel consumption for curing tobacco, varieties of fuel used for curing tobacco, and identified methodologies for reduction in fuel consumption:

1.1 Specific Fuel Consumption (SFC): The quantity of fuel required to cure 1 Kilogram of tobacco is called as specific fuel consumption (SFC) [4]. The region wise details of SFC is given in the graphs below:



The SFC or quantity of fuel (in Kg) required to cure 1 Kg of tobacco was found to be 4.5. The variation in SFC among the districts surveyed was found very less. This shows that the tobacco farmers are well aware of the curing process and use best practices while curing, ensuring reduction in fuel usage. Further SFC in Indian FCV tobacco curing is very less when compared to other countries where tobacco is grown.

1.2 Varieties of fuel used: Across the surveyed area, the major portion (approx. 63% fuel) used for tobacco curing are alternative fuel (viz., Prosopis juliflora weed, Coconut fronds, Carpentry waste, Coffee stem etc), Eucalyptus (10%), Acacia (9%) and the rest approx. 18% are the other fuels. The table below details the region wise consumption of various fuel varieties for curing tobacco.

	Karnataka	Andhra	Total
Alternative fuel	66.7%	58.3%	62.8%
Nilgiri (EUCALYPTUS)	17.8%	1.0%	10.0%
Hercules (ACACIA)	0.1%	18.5%	8.6%
Other fuels	15.4%	22.3%	18.4%
Total farmers	1,803	1,555	3,358

It may be noted that only unusable or leftover wood is used for curing. The whole log of the tree is never used for curing purpose.

1.3 Reduction in Fuel Consumption: The survey revealed that Indian tobacco growers are aware of best practices related to tobacco curing to reduce fuel consumption. In the FGDs, growers informed that insulating roof and vents of barns, use of proper furnace leads to better curing of tobacco with improved fuel efficiency and it was found that almost all the farmers follows the suggested technology to reduce the fuel consumption.

2. The Fuel Supply chain : More than 95% of the growers procure different types of fuel from Local Trader, while only 4.3% of the grower directly procure from Plantations grown by other farmers (raised in farmer own land) respectively. Most important fuel procuring source for the Local traders were Local Growers (94%) followed by directly using the fuel

grown in their own farm fields (5%).

2.1 Source of fuel used by tobacco growers: The main source of fuel by tobacco growers are (a) Local fuel traders; (b) Own Plantations grown by farmers in their farms. The district wise usage of various fuel by Local traders and own plantations by the farmers, is detailed below:

	Mysore	Hassan	Prakasam	Nellore	W.Godavari	Karnataka	Andhra	Total
Local Fuel Trader								
% Fuel	96.60 %	97.10 %	92.90 %	99.10 %	96.50 %	96.60 %	94.60 %	95.60 %
Own plantations grown by the farmers in their farms								
% Fuel	3.50 %	2.80 %	7.10 %	0.90 %	3.40 %	3.50 %	5.40 %	4.30%
Total farmers	1,559	244	940	116	499	1,803	1,555	3,358

95% of the fuel used by tobacco growers is sourced through local fuel traders and remaining is sourced through own plantations grown in the farmer's own field.

2.2 Source of fuel procured by local trader: The source of fuel procured by local trader is divided into 3 groups:

- Procurement from local grower/suppliers.
- Plantations grown by local fuel traders in their own farms.
- Procurement from another fuel supplier.

The district wise details of fuel source to the local fuel trader is given below:

	Mysore	Hassan	Prakasam	Nellore	W.Godavari	Karnataka	Andhra	Total
Local Growers /Suppliers	80.8 %	97.9 %	98.8%	100 %	100 %	85.3 %	99.2 %	93.7 %
Plantations grown by local fuel traders in their own farms	15.4 %	2.1 %				11.9 %		4.8 %
From another supplier	3.1%		1.2%			2.3 %	0.8 %	1.4 %
Total local fuel traders	130	47	170	21	73	177	264	441

As per the fuel supplier survey, it was observed that:

- Local Growers /Suppliers - Nearly 94% fuel traders sourced the fuel used by the tobacco growers from the farmers who grow different kinds of fuel in their farm land.
- Plantations by local fuel traders grown in their own farms– About 5% use the fuel from the plantations by the

farmers, which they transported and sold through their outlet.

- From another suppliers – Just about 1.4% mentioned of sourcing those fuel from other suppliers/traders.

The above data reveals that no local trader or FCV farmer is using fuel from forest or any unauthorized sources. All the fuel used in tobacco curing are from legal sources and there is no threat observed on deforestation.

IV. SUMMARY

The findings of “fuel consumption practices – Andhra Pradesh and Karnataka” is summarized below:

Specific fuel consumption: The average SFC was found as 4.5. The variation in SFC among districts surveyed was found very less. Most growers are contemplating of insulating the roof conserve heat inside the barn, besides using a curometer for using optimum amount of fuel for curing and also having insulated barn roofs and are maintaining good vents.

Sustainable fuel sourcing: The survey found that the type of fuel used for curing were only fuel varieties of wood used. No hard wood or timber was used for curing in the surveyed regions. Sustainable sourcing of fuel for curing of tobacco is demonstrated due to every year plantation from farming community and usage of alternative fuel viz., Prosopis (weed) and agricultural waste like coffee husk, coconut fronds and carpentry waste etc. 94% local fuel traders sources, the fuel used by the tobacco growers, from the commercial farmers who grow the fuel in their own farms. Remaining fuel is either sourced through plantation in the fields (farms) of local fuel traders or procurement from another traders/suppliers. No deforestation has been observed for tobacco cultivation. Finally the survey reveals the self-sufficiency and sustainability in fuel usage for tobacco curing in Indian FCV and displays no threat to any kind of deforestation.

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