

Sponged Tobacco: Meteorological and altitude influences on curing methods in flue cured systems in South Africa



Henri du Plessis ¹ & Herman J. Roos ²

(1) Limpopo Tobacco Processors (Pty) Ltd, 67 Molen Street, Rustenburg 0300, South Africa

(2) Tobacco Producer, Rustenburg, South Africa

INTRODUCTION

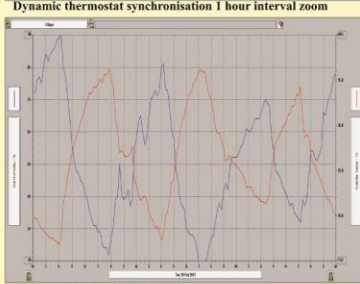
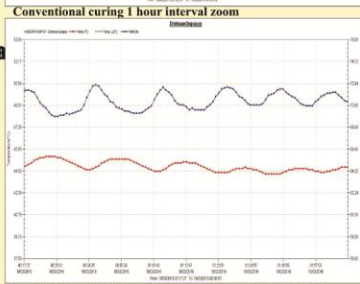
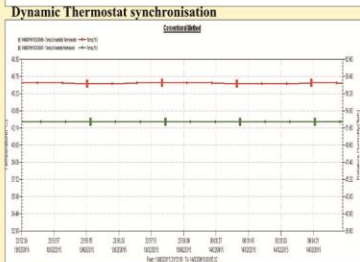
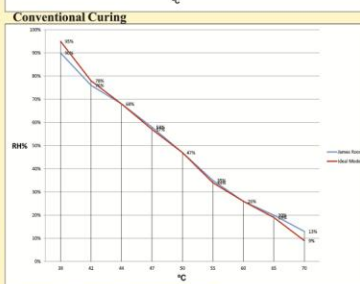
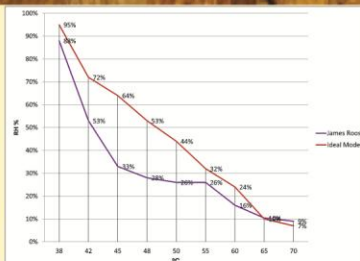
Flue cured tobacco in South Africa, has over the years produced high amounts of sponged leaf, although the reaping of the leaf was done at the correct physiological time. The question is if the problem was due to incorrect curing methods and meteorological influences and altitude. If so, how is it rectified? To substantiate our hypothesis data loggers were implemented, these were placed in three locations inside the barn. Data showed that the results correlated with the statement, finding that the rapid loss of moisture was due to the curing areas being situated 1000 meters above sea level. Each data sample was analysed focusing on 1 hour intervals at the crucial stages of curing. Analysing the data from a weather station, it was found that there was a correlation between loss of moisture from the barns and meteorological conditions outside the barn. A new curing method and system were devised to maintain the wet bulb at 38°C. This system connects the wet bulb directly to the thermostat, using only the wet bulb as control method. The conclusion after three seasons of comparing data and leaf quality as well as the difference in sponged percentage of tobacco between manual curing and "Dyna-Thermo-Sync", is stark. Farmers showed results of 0% sponged tobacco from barns on this system, compared to barns that produce on average 20% plus sponged leaf with conventional methods. It was also found that the system reduced curing time and had a reduction on the overall cost. The meteorological influence and altitude on curing were found to be definite and not negligible as was the original perception.

METEOROLOGY AND ALTITUDE

Altitude is the term used to describe height above sea level using air pressure, indicated in meters or feet. With an increase in elevation a decrease in air pressure takes place at a constant rate of 1hPa per 10m elevation. Geographical position and micro climatology plays a significant role on the actual air pressure. In most tobacco production areas the mean average of air pressure is 900hpa, thus a significant reduction of 113hpa. A unit at a high altitude has a disadvantage due to the air pressure and air density being lower than the unit at a lower altitude. This also explained why the units in the high altitude tobacco production areas are losing more water vapour on the current prescribed method of curing

DATA COLLECTION

To identify the cause of sponged leaf during curing, data loggers were used in conjunction with a Davis Vantage Vue weather station. Gathering between 9500 and 12 000 data points on each curing session, the first was installed inside the tobacco on the first load line, the second was placed next to the operators monitoring device and the third was placed inside the tobacco on the third load line. The accompanying graphs indicate data:



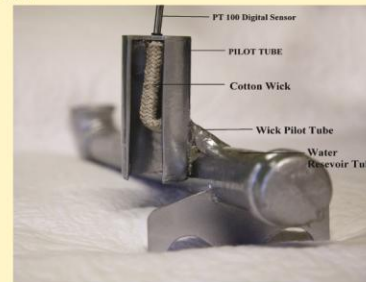
Producer 1				
Dyna-Thermo-Sync				
Standard	Sub Standard	Farm Scrap	K	Tobacco
14065.2 KG	875.2 KG	1676.6 KG	9163.8 KG	
54.55%	3.40%	6.50%	35.73%	
R 36.29 p/kg				

Producer 2				
Conventional Curing				
Standard	Sub Standard	Farm Scrap	K	Tobacco
9305.6 KG	803.6 KG	2262.2 KG	17449.4 KG	
31.20%	2.69%	7.50%	58.51%	
R 33.01 p/kg				

*K Tobacco is sponged tobacco
Comparison of two producers

OBSERVATIONS AND NEW SYSTEM IMPLEMENTATION

The Dynamic Thermostat Synchronisation connects the wet bulb directly to the thermostat, using a digital temperature controller.



Dynamic Thermostat synchronisation

RESULTS

Using the Dyna-Thermo-Sync as a solution to adverse meteorological changes, it was noted that the dry bulb and wet bulb followed a wave-like pattern, simulating the laws of nature. Seeking answers to this phenomenon, weather station data was analysed and it was found that this system simulates the exact weather patterns under which tobacco is grown. Curing time was reduced from average of 192 hours (eight days) to a desired 144 Hours (six days). Some producers reported that their coal usage was significantly lower.

End of season comparison off two producers who cultivated the same varieties of tobacco under harsh conditions (600mm of rain in four weeks) showed that the Dyna-Thermo-Sync produced a better quality tobacco.

CONCLUSION

South Africa's tobacco production areas, situated in semi-arid regions and at elevations of more than 1000 meters are influenced by meteorological, geographical and altitude differences. As was proven by the data analysis, these effects lead to human error, due to the operator not being able to accurately judge and measure these factors on the system. The "Dyna-Thermo-Sync" as simple system proved that the effects of altitude and meteorology could be overcome and that the energy inside the unit could still be kept in equilibrium, even after changing the dynamics of the system by opening the ventilation and adding more air to the system. In conclusion, it must be stated that this research is in its 3rd year and is still continuing, focusing on aspects of wind speed and fan CFM.

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