Development of a Control System for a Far-Infrared Speciality Coffee Roaster to Optimize Roasting Parameters

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Coffee is one of the most traded agricultural commodities in the world. There are several value-added products of coffee. Specialty coffee is one of the most popular and profitable products of coffee. Specialty coffee represents the strong demand for premium coffee. Roasting plays a major role in the production of specialty coffee. There is a lack of a proper roasting machine to produce speciality coffee for Sri Lankan varieties using far-infrared (FIR) radiation. Temperature profiles are specific for the variety, the roasting machine & roasting method. Roasting in bulk roasters is less uniform and it is difficult to follow a temperature profile. This study was conducted to develop a variety specific temperature profile for the developed FIR based roaster which gives speciality coffee with expected quality and to automate the optimum roasting process. A python programme was coded and tested using the developed coffee FIR roaster. It is experimented that 735 s roasting profile gives too dark colour while 360 s roasting profile gives light colour. But 420 s roasting profile gives in between 735 s and 360s profile colour. The roasting profile was successfully followed by the method used in the study. With a proper controlling mechanism to follow the roasting profile FIR coffee roasting would be a better roasting mechanism compared to traditional convective roasting methods.

Keywords: Coffee, Far-infrared radiation, Roasting, Temperature profiles

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