Abstract

Green roofs are one of many elements of a sustainable landscape that have existed for decades around Europe and whose popularity in the states has increased over the past few decades. Due to the initial costs of such a roof, in addition to the maintenance, particularly in the variable climate of New York City, has hindered in its feasibility. Implementing a heated piping system, similar to those of heated sidewalks can reduce the weather impacts on the plants, extend the growing season and crop yield providing for reduced maintenance and seasonal costs of a green roof. This thesis ran three modeling techniques to predict the temperature at various locations throughout the test bed. The result of these test matched within 5-20%, depending on the location and technique, between the theoretical point and the experimental point. The results established the feasibility of applying a Fluent model system. With this predictive capacity of the thermal response at steady state of the intensive soil used on green roofs, it is possible to predict the ideal locations within a given bed to plant seed with particular climate requirements. Degrees of modification of the various characteristics of the bed would then be feasibly ascertained. This can be later used to design a control system. Predicting the thermal distribution within these beds increases the economic viability of roof gardens and urban farming in New York City by reducing the maintenance costs of rooftop gardens.