

Valorisation of pozzolan sand as a composite filler for use in fused filament fabrication (FFF)

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In the global additive manufacturing market, 3D extrusion printing continues to grow. It offers total design freedom for complex parts in one fabrication step with less waste produced compared to the tradictional fabrication process. At same time, the choice of eco sustainable polymer materials available for 3D printing process is limited. For this reason, the development of new eco-materials optimized for this type of fabrication and for new applications have a relevant interest.
An important concept in the field of environmental protection is the “precision agriculture”. This is used to define technologies that support customized agricultural practices aimed at higher efficiency and a lower impact on the environment.
One of the possible applications in the horticulture sector is the design of self-regulated water dosing pots. These feeders have the advantage of being able to irrigate the plant even for long periods. However, they are generally produced with non-ecological materials and with many complex parts assembled.
This work aimed to develop an eco composite polymer based on pozzolan waste for the FFF 3D printing fabrication, where the pozzolan used resulting from the querry separation on fine part in the range size of 0/3 mm. In addition, the composite materials obtained was used to producess a self-regulated water dosing pots with a complex geometries in the form of porous structures to regulate the passage of water from the storage area to the roots of the plant. A semplifed scheme is reported in the follow figure.

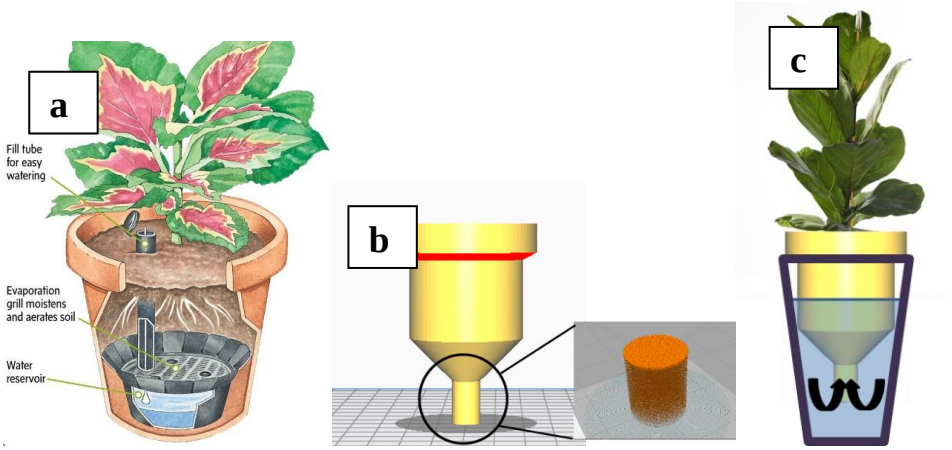


Figure - Simplified scheme of operation of automatic watering (a), Model for 3D printing with a porous base (b), Simplified scheme of operation of automatic watering printed in 3D.

Biography

Nicola Schiavone is a PhD student at the Sigma-Clermont istitute. His research focuses on the valorization of natural waste materials in the field of polymer composite used in additive manufaturing fabrication.

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