Davor Kržišnik prejemnik nagrade za najbolj inovativno predstavitev na mednarodni konferenci o zaščiti lesa

Davor Kržišnik received the Viance Innovation Award at the International Research Group on Wood Protection Conference

Teja Bizjak Govedič

Konec maja 2024 je Mednarodna raziskovalna skupina za zaščito lesa (International Research Group on Wood Protection) v Knoxvillu, ZDA, organizirala že 55. konferenco o zaščiti lesa. Organizacija s približno 330 člani iz 50 držav, vključno s Slovenijo, vsako leto priredi konferenco, na kateri se zvrsti med 100 in 200 prispevkov. Na letošnji konferenci je nagrado »Viance innovation award«, ki jo podeljuje podjetje Viance za najbolj inovativno predstavitev, med 87 predstavitvami prejel doc. dr. Davor Kržišnik z Univerze v Ljubljani, Biotehniške fakultete, Oddelka za lesarstvo.

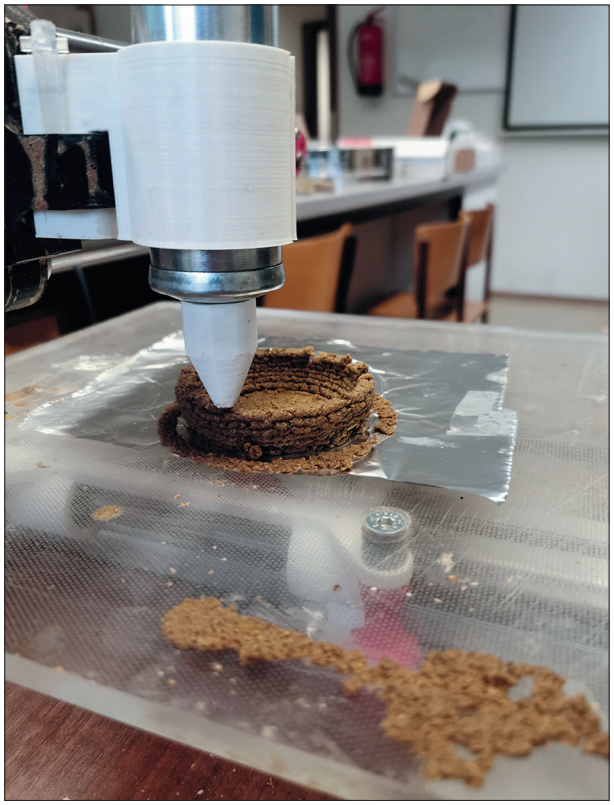
Doc. dr. Davor Kržišnik je na srečanju predstavil izsledke raziskave, ki je nastala pod njegovim mentorstvom in somentorstvom doc. dr. Mirka Kariža, v okviru diplomskega dela, ki ga je pripravil študent Blaž Žuran. V raziskavi so razvijali nove materiale, ki omogočajo 3D tisk z uporabo glivnega micelija. Industrija 3D tiska se namreč sooča z vse večjo potrebo po uporabi alternativnih, biorazgradljivih materialov iz obnovljivih virov. V raziskavi so preizkusili materiale, ki temeljijo na trajnostni rabi urbanih ostankov, kot so pivske tropine, otrobi, lesni peleti in odslužena kavna usedlina. Kot vezivo so uporabili glivni micelij, ki omogoča preprosto razgradnjo materialov ob koncu življenjskega cikla izdelka. Nastali kompoziti so obetavni predvsem za trajnostno embalažo, izolacijo in podobne produkte.

V seriji laboratorijskih poskusov so najprej preverili, kateri substrat je najprimernejši za rast gliv. Nato so pripravili različne paste za 3D tisk in na koncu izvedli 3D tisk izdelka z najustreznejšo pasto. Ta pasta je morala imeti primerno viskoznost in vsebovati ustrezno majhne delce, da je bil tisk mogoč. Poleg tega je njena sestava morala zagotavljati, da natisnjen izdelek obdrži želeno obliko.

Po uspešno natisnjenem izdelku je micelij v rastni komori izdelek prerastel v približno desetih dneh. Lastnosti izdelka, ki je bil po inkubaciji v rastni komori posušen na 60 °C, so bile več kot zadovoljive. Obdržal je želeno obliko skodelice in bil dovolj kompakten, kar dokazuje, da je tisk s takim materialom mogoč in da so nadaljnje raziskave na tem področju zelo obetavne.

Slika 1. Podelitev nagrade (od leve proti desni): dr. Rod Stirling, predsednik IRG, nagrajenec dr. Davor Kržišnik in dr. Kevin Archer, direktor raziskav in razvoja v podjetju Viance (Foto: dr. Dennis Jones).

Figure 1. The award ceremony (from left to right): Dr Rod Stirling, President of the IRG, Dr Davor Kržišnik, the recipient of the award and Dr Kevin Archer, Director of Research and Development at Vinace (Photo: Dr Dennis Jones).



Slika 2. 3D tiskanje s pasto iz mešanice substrata, glivnega inokuluma in sredstva za želiranje, v tem primeru koruznega škroba (Foto: Blaž Žuran).
Figure 2. 3D printing with a paste made from a mixture of substrate, fungal inoculum and a gelling agent, in this case cornstarch (Photo: Blaž Žuran).

At the end of May 2024, the International Research Group on Wood Protection held its 55th conference in Knoxville, USA. The organization has around 330 members from 50 countries, including Slovenia. The IRG's scientific conferences are held annually and are attended by between 200 and 360 participants. Between 100 and 200 lectures and poster presentations are given at the annual conference each year. At this year's conference, the Viance Innovation Award for the most innovative out of 87 presentations was awarded to Assistant Prof. Dr Davor Kržišnik from the University of Ljubljana, Biotechnical Faculty, Department of Wood Science and Technology.

At the meeting, Dr Davor Kržišnik presented the results of research carried out under his mentorship and the co-mentorship of Assistant Prof. Dr Mirko Kariž, as part of Blaž Žuran's diploma thesis. In their research, they developed new materials that enable 3D printing with the help of fungal mycelia. This is because the 3D printing industry is facing a growing demand to use alternative, biodegradable materials from renewable sources. As part of the awarded research a number of materials were tested that are produced based on the sustainable use of urban waste, such as brewer's grain, wheat bran, wood pellets and used coffee grounds. Fungal mycelium was used as a binder, which enabled easy decomposition of the materials at the

Slika 3. Natisnjena posodica pred preraščanjem z micelijem (levo) in po preraščanju (desno) (Foto: Blaž Žuran).
Figure 3. 3D-printed pot before fungal overgrowth with mycelium (on the left) and after overgrowth (on the right) (Photo: Blaž Žuran).

end of the product's life cycle. Composite materials of this type are particularly promising for sustainable packaging, insulation and similar uses.

In a series of laboratory experiments, it was first identified which substrate was best suited for the growth of fungi. Afterwards various pastes for 3D printing were prepared, and finally the product was 3D printed with the most suitable paste. This paste had to have an appropriate viscosity and contain sufficiently small particles for printing to be possible. In addition, the composition had to ensure that the printed product retained the desired shape.

Once the product had been successfully printed, the mycelium in the growth chamber outgrew the product within around ten days. The properties of the product, which was dried at 60°C after incubation in the growth chamber, were more than satisfactory. It retained the desired shape of the cup and was compact enough, proving that printing with such a material is possible and that further research in this area is very promising. ●