The 'Soil Cover App' – a new tool for fast determination of dead and living biomass on soil

Thomas Bauer (1), Peter Strauss (1), Peter Riegler-Nurscher (2), Johann Prankl (2), and Heinrich Prankl (2)

(1) Institute for Land and Water Management Research, Federal Agency for Water Management, Petzenkirchen, Austria), (2) Josephinum Research, Wieselburg, Austria

Worldwide many agricultural practices aim on soil protection strategies using living or dead biomass as soil cover. Especially for the case when management practices are focusing on soil erosion mitigation the effectiveness of these practices is directly driven by the amount of soil coverleft on the soil surface. Hence there is a need for quick and reliable methods of soil cover estimation not only for living biomass but particularly for dead biomass (mulch). Available methods for the soil cover measurement are either subjective, depending on an educated guess or time consuming, e.g., if the image is analysed manually at grid points.

We therefore developed a mobile application using an algorithm based on entangled forest classification. The final output of the algorithm gives classified labels for each pixel of the input image as well as the percentage of each class which are living biomass, dead biomass, stones and soil. Our training dataset consisted of more than 250 different images and their annotated class information. Images have been taken in a set of different environmental conditions such as light, soil coverages from between 0% to 100%, different materials such as living plants, residues, straw material and stones.

We compared the results provided by our mobile application with a data set of 180 images that had been manually annotated A comparison between both methods revealed a regression slope of 0.964 with a coefficient of determination $R^2 = 0.92$, corresponding to an average error of about 4%. While average error of living plant classification was about 3%, dead residue classification resulted in an 8% error. Thus the new mobile application tool offers a fast and easy way to obtain information on the protective potential of a particular agricultural management site.