

Aktion Österreich-Tschechien, AÖCZ-Projektstipendien

SCHOLARSHIP REPORT

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Stay from **19/10/2015** Stay to **13/11/2015**
Tag/Monat/Jahr Tag/Monat/Jahr

The scholarship report (progress report, 1-2 pages) has to be completed by you and signed by you and your supervisor. Please scan the completed and signed scholarship report and send it with email to your OeAD-Regional Office to effect the payment of your last scholarship instalment. Please note that received scholarships may have to be paid back should the scholarship report not be submitted!

A soil in region of Czech Republic and Austria is continuously losing its natural property to retain water in its structure. Most of the water which comes from rains just goes through the soil into the groundwater and agricultural lands suffer by the lack of humidity. One of the reasons of this strange soil behaviour is caused by decreasing amount of organic soil matter. Solution of this problem can be found in application of superabsorbent polymers enriched by addition of active substance based on humic acids. This system of controlled released preparation is able to retain more water in the ground together with sustainable supply of humic acids which are important part of organic soil matter. Rheological properties of samples superabsorbent polymers enriched by humic acids were determined to prove if they are able to resist certain mechanical stress which they will have to hold out after agricultural application.

Superabsorbent polymers have a wide range of usage. In the field of agriculture and environmental protection they are very often used as a water hanger during a dry season nowadays. In contrary they avoid to decay of plants' root system in the time of heavy rains. There is a new trend in a field of superabsorbent polymers and it is an incorporation of fertilizers into the gel structure. This can be consider as a functional system which allows controlled release of substances that support growing and maturing of plants. Such mechanism solves the problem with flushing of fertilizers into deep underground water and avoids to overfertilize of ground as well.

During the four weeks at Johannes Kepler University, novel superabsorbent material for agricultural and environmental application was reported. The properties of specific superabsorbent polymers are extremely important for selecting a material for a given application. The method of characterizing superabsorbent polymers was discussed using rheological techniques to probe their mechanical response.

Eight different samples of superabsorbent polymers based on acrylic acid were used during experiments. All of them have a certain addition of NPK fertilizer. Some of them have also an addition of humic substance in a form of commercial lignohumate. Furthermore the samples also differ in a content of acrylamide in the structure. There was big effort to avoid presence of acrylamide in the structure of superabsorbent because of its toxicity.

The viscoelastic experiments of the fully swollen superabsorbent polymer particles were carried out in Anton Paar Physica MCR 501 rheometer. The measurement was done at 20 ± 2 °C using a parallel plate system (PP25-SN6375, 1 mm diameter) at 1 mm gap. Viscoelastic measurements, oscillation – frequency sweep and strain sweep, were performed for each sample and the obtained values of moduli G' and G'' were compared. Storage modulus G' is proportional to the extent of the elastic component and loss modulus G'' is rational to the extent of the viscous component of the system. The strength of materials is measured by the magnitude of $\tan \delta$ (the ratio G''/G'), where δ is a phase angle.

Confirmed by

Confirmed by

24.11.2015 *[Signature]*

19.11.2015 *[Signature]*

(Dr. Milan KRACALIK)
Date of interview, Stamp of the Institute of Polymer Science
 

(Romana KRATOCHVILOVA)
date, signature