

EDUCATION OF HIGH SCHOOL NOVA GORICA

1. WATER POLLUTION WITH AMMONIA AS A RESULT OF AGRICULTURAL ACTIVITIES

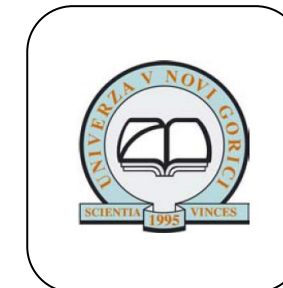
Agriculture is an important way of industry that provides self-sufficiency of the country. In addition to the forestry sector it comprises the most extensive surface area of Slovenia.

Due to the intensive and extensive agricultural operations in the past, agriculture is one of the most important causes of pollution. Contamination of surface and ground water with ammonia is a result of leaching of fertilizers (bovine manure, liquid manure, inorganic fertilizers like ammonium nitrate), which are used on agricultural land to improve soil fertility.

Modern agriculture is directed in organic farming. Here we apply the principles of nutrient cycling within the farm and the prohibition of any use of chemical synthetic products.

Some examples of good agricultural practices, that reduce the impacts of agriculture on environment:

- Planting of native plant species along streams, which would prevent the leaching of nutrients directly into the stream.
- Fertilizers should be stored, and delivered in watertight containers
- Fertilization of agricultural land needs to be done especially in green surfaces, otherwise the loss of ammonia / nitrate into groundwater is large.
- Prohibition of using active substances in water protected zones.
- Prohibition of fertilising on agricultural land within a distance of 5-15 m from the stream.
- Reduction of soil and vegetation pollution - crop rotation.
- Prohibition of feeding the animals with animal feed (like bone meal), using hormones or preventive use of antibiotics.
- To prevent loss of plant nutrients is necessary to ensure cover of arable land also outside the growing season.



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Projekt sofinanciran v okviru Programa čezmejnega sodelovanja Slovenija-Italija 2007-2013 iz sredstev Evropskega sklada za regionalni razvoj in nacionalnih sredstev
Progetto finanziato nell'ambito del Programma per la Cooperazione Transfrontaliera Italia-Slovenia 2007-2013, dal Fondo europeo di sviluppo regionale e dai fondi nazionali



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2. EXPERIMENTAL WORK

Spectrophotometric determination of ammonia with TEKAN-APPARATUS in the samples of streams Koren and Vrtojba. The concentration of ammonia was greatly varies, depending on the location of the sampling.

Preparation of the samples:

- Put 40 ml of the sample into a 50 mL flask.
- Add 4 ml of previously prepared solution A (see standard procedure).
- Add 4 mL of pre-prepared solution of B (see the standard procedure).
- Fill the flask with twice deionised water.
- Reconstituted solution is boiled at 25 °C for 1 hour in the oven

Measurements of the samples:

- 300 µL of boiled sample placed on a microtiter plate
- Measurement of absorbance with TEKAN-apparatus at a wavelength of 650 nm.

RESULTS:

The concentration of ammonia in the stream of Koren reaches a value of 39 mg/L. On the sample site Vrtojba – Rožna dolina was measured value 0.11 mg/L, while in section Vrtojba - Miren field the value increased to 19.5 mg/L. We can conclude that in the Vrtojba - Miren field the concentration of ammonia is larger because of present agricultural activities.

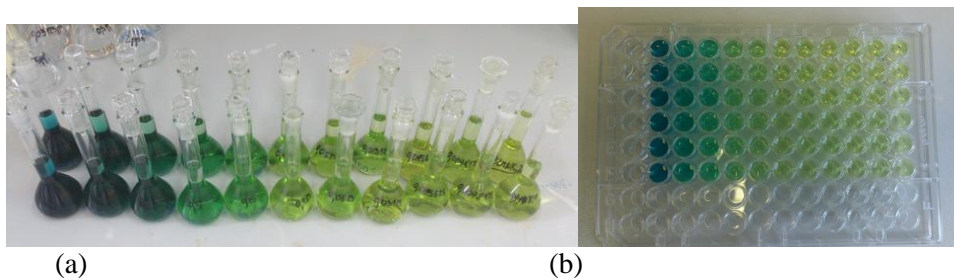
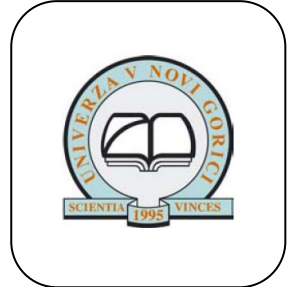


Figure 1: Preparation of the calibration curve (a) and the coating on the microtiter plate (b)

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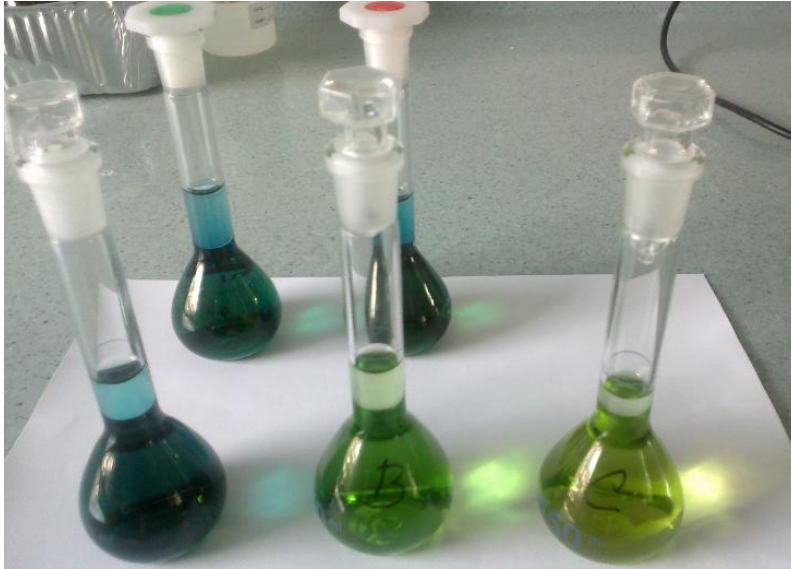


Figure 2: Sample preparation of stream Koren (left), followed by Vrtojba (Vrtojba – Miren field), Vrtojba – Rožna dolina (right)
 NOTE * Stream Koren and Vrtojba (Vrtojba – Miren field) had too high concentration of ammonia to measure them with TEKAN device (the back flasks), so we must diluted them (in front of the flask).



Figure 3: Sample of the stream Koren (left), Vrtojba - field (in the middle), Vrtojba – Rožna dolina (right).

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