TESTING TOXICITY OF OILY GROUNDS USING PHYTOTOXKIT ™ TEST

Agnieszka BARAN, Czesława JASIEWICZ, Jacek ANTONKIEWICZ

Department of Agricultural Chemistry, University of Agriculture in Krakow

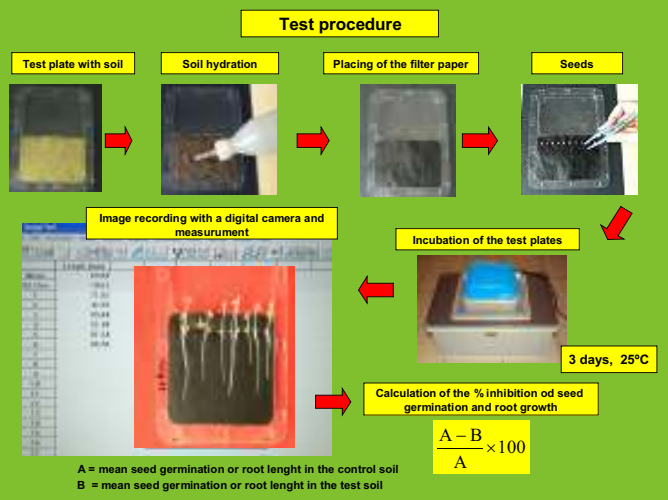
The investigations were conducted to assess toxicity of grounds susceptible to runoffs from the second hand car market localization near Kielce.

MATERIAL AND METHODS

1. According to the regulation of the Minster of the Natural Environment dated 9 September 2002 on the soil quality standards and earth quality standards [Journal of Laws No. 165, item 1359] the analyzed grounds were classified into group B.

2. 10 soil samples were collected from the depth of 0-30 cm for analyses. Toxicity test Phytotoxkit was performed in the soil samples using the plants: germinating and root growth for mustard (*Sinapis alba*), watercress (*Lepidium sativum*) and sorghum (*Sorghum saccharatum*).

3. Chemical analysis of the soil samples comprised determination of the heavy metal contents (Cr, Zn, Pb, Cu, Cd and Ni) and carbohydrates C_6-C_{12} (petrol – total) and C_{12}-C_{35} (mineral oil). Total heavy metal contents in the grounds were assessed after hot mineralization in a mixture of HNO_3 and $HClO_3$ acids using ISP-EAS method, while hydrocarbons content using gas chromatography.



RESULTS

PHYTOTOXKIT ™ TEST

1. On the basis of conducted Phytotoxkit test it was found that sorghum was the plant which most strongly responded to the soil pollution. The degree of germination and growth process inhibition in this plant roots was the greatest and reached respectively about 30% and 52% in relation to the reference soil.

2. Weaker inhibition of germination process and root lengths, respectively about 20% and 25% was noted in mustard.

3. Watercress proved the plant most resistant to phytotoxic effect of oil-derivatives and heavy metals. Inhibition process of the analyzed parameters in this plant was slight, reaching c.a. 10% (germination) and c.a. 17% (root growth).

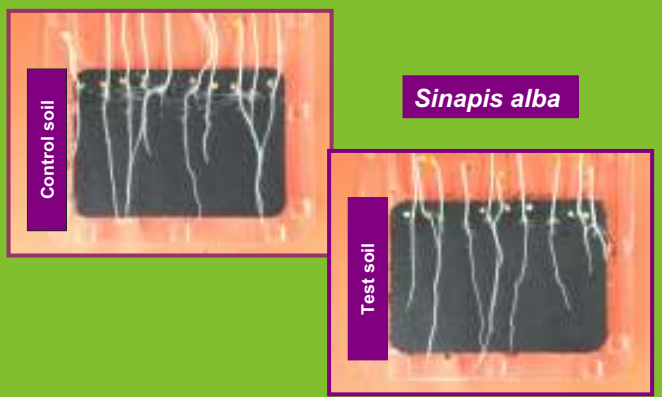
CHEMICAL ANALYSIS OF THE SOIL SAMPLES

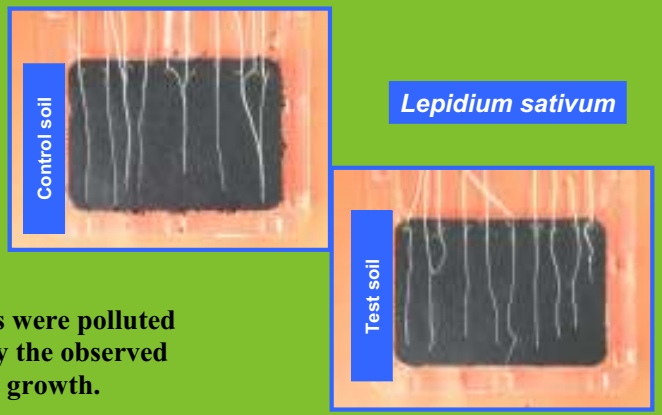
1. The analyzed samples contained from 3.95 to 24.15 mg Cr, from 36.80 to 395 mg Zn, from 3.85 to 157.50 mg Pb, from 2.08 – 36.13 mg Cu, 0.20 – 3.68 mg Cd and from 4.70 to 19.08mg Ni kg^{-1} of soil.

2. The results of chemical analysis conducted on the soil samples revealed exceeded contents of lead in three samples and zinc in one [Journal of Laws, No. 165, Item 1359]. The contents of the other heavy metals: chromium, copper, cadmium and nickel remained within the norm.

3. Also exceeded permissible concentrations of C_6-C_{12} carbohydrates, as stated in the Regulation of the Minister of the Natural Environment [Journal of Laws, No. 165, Item 1359] were registered in the analyzed soil samples. Chemical pollution of soil with hydrocarbons testifying petrol presence was between 3.5 and 11 times higher that the permissible norm and reached from 3.32 to 11.1mg kg^{-1}.

4. Exceeding the permissible contents of C_{12}-C_{35} hydrocarbons evidencing mineral oil presence were assessed only in one sample and the content of these compounds fluctuated from 2.21 to 59.4 mg kg^{-1}.





CONCLUSIONS

Summing up the obtained results it was stated that the examined grounds were polluted chemically with oil derivatives and heavy metals which was confirmed by the observed phytotoxic effect, i.e. a considerable reduction of the test plant root growth.