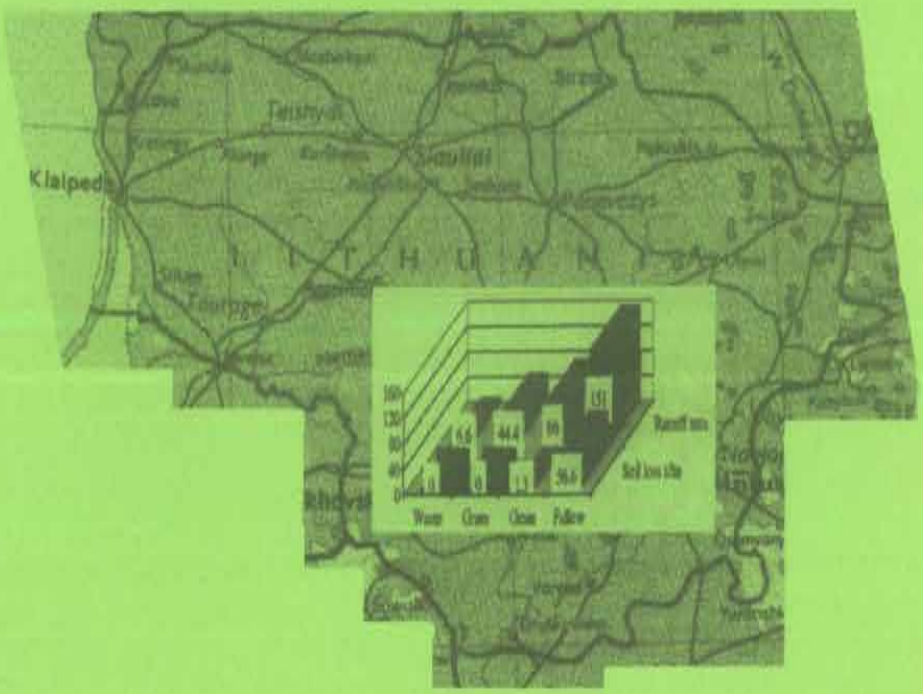
NEWSLETTER 3 + 4 / 1998

ESSC EUROPEAN SOCIETY for SOIL CONSERVATION



E.S.S.C. NEWSLETTER 3 + 4 / 1998

Produced and composed by the Editor-in-Chief, Silsoe, June 1998

Printed by Cranfield University Press

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A NEW METHOD FOR DETERMINING SOIL PHOSPHATASIC CAPACITY

Introduction

Knowledge of the phosphatase potential of a soil is important for studies of soil biology and plant nutrition. Up to now, research on soil enzyme activity has been based on the behaviour of enzymes against a certain artificial substratum introduced in the reaction mixture at the beginning of the experiment. Rogers (1942), using calcium glycerophosphate as a substratum, proved the existence of phosphomonoesterase in soil by determining the quantity of available mineral phosphorus released from the substratum under enzyme action. Kroll and Kramer (1955) also proved the existence of phosphomonoesterase using disodic phenylphosphate as the substratum. Their method, based on determining the level of soil phosphatase activity indirectly by quantifying the release of phenol from the enzymatic hydrolysed di-natrium phenylphosphate, has long been accepted. However, Tabatabai and Bremner (1969) proposed using p-nitrophenylphosphate instead of di-natrium phenylphosphate, incriminating the phenol fixation in the soil adsorptive complex. Nannipieri et al. (1973) demonstrated that the p-nitrophenylphosphate is retained to a certain extent in the soil complex.

Although different phosphatase activities may occur simultaneously in a soil, the present methods require a specific substrate for each type of phosphatase. Since the data are analysed and interpreted as a soil phosphatase potential (Chen et al. 1982; Dick, 1994; Trasar-Cepeda et al. 1998), question arises about the true coincidence between the type of accumulated phosphatase in the soil and the enzyme substrate used.

Based on the work of Pavlovschi and Ionescu (1941) concerning the hydrocarbonate combinations with phosphate ions, we doubt the methods used to quantify the phosphate ions which are enzymatically released because they recombine spontaneously with different minerals in the soil reaction mixture, thereby falsifying the results of the total phosphatase potential. A new method of quantifying the total soil phosphatase capacity is required which takes account of the natural complexity of the phosphorus combinations in soil (Ştefanic et al. 1965).

In the method proposed here, a definite quantity of glucose is used as a trap. The phosphate ions released in the reaction mixture by enzyme activities are bound by a part of the glucose. Another part of the glucose, uncombined, is quantified spectrophotometrically and the amount subtracted from the quantity of glucose identified in the reaction mixture before the enzyme activity begins. The difference indicates the amount of phosphate ions which has been enzymatically released.

Materials and methods

Soil samples were collected from the arable layer of different soil types ranging from acid through neutral to alkaline, namely albic luvisol (AL), haplic luvisol (HL), haplic chernozem (HCh) and vermi-calcic chernozem (VCC). Total phosphatase activity was determined as follows:

- 5 g of fresh soil was passed through a 2.0-2.5 mm sieve;
- the seived soil was mixed with 10 ml of natrium azide (0.015%), containing 25 mg of glucose, and then placed in a 100 ml bottle and tightly stopped with a rubber cork;
- after a reaction period of 24 h at 28° C, 40 ml of kalium alaun (0.3%) was added to the mixture which was then stirred for 20 minutes and then filtered;
- a 1 ml sample is taken from the filtrate and treated in a test tube with 3 ml of dinitrosalicylic acid reagent (DNSAR);
- the mixture is kept in boiled water for 1 minute, then refrigerated quickly in cold water before adding distilled water up to 20 ml;
- a separate reaction mixture is prepared which is immediately stirred for 20 minutes and filtered (i.e. no incubation);
- a 1 ml sample is taken of the second filtrate and treated in the same way as the first;
- the extinction of both filtrates treated with DNSAR is measured spectrophotometrically at 540 nm;
- separately a linear regression is calculated for the glucose standard scale in the interval of 1-5 mg/ml:

$$Y \text{ (mg glucose)} = ax + b \qquad (1)$$

where x is the extinction. Our previous research has shown a value of 0.02 for the average coefficient of the glucose combination with phosphoric acid (for the possible concentration limits in the enzyme reaction mixture). An example of our calculations gives:

$$P = (Et_0 - Et_{24}) \times 1.194 \times 50 \times 20 \times 0.02 \qquad (2)$$

in which P = phosphorus-P (mg/100 g of soil); Et_0 = extinction at time 0 h; Et_{24} = extinction at time 24 h; 1.194 = coefficient a in equation (1); 50 = the number of ml in the reaction mixture; 20 = the coefficient for the calculation at 100 g of soil; and 0.02 = the coefficient for the equalisation of the glucose to phosphorus (P).

Equation (2) can then be rewritten:

$$P = (Et_0 - Et_{24}) \times 23.88 \qquad (3)$$

The P value is then corrected for soil humidity, becoming P (mg/100 g of soil d.s.) released enzymatically in 24 h at 28° C and measuring the total phosphatase potential of the soil.

Results

The results (Table 1) show that the highest total phosphatase potential (1.62 mg and 1.63 mgP) was found in the more fertile soils of the cambic chernozem (HCh) and the carbonaceous calcic chernozem (VCC) which are rich in humus and organic phosphorus and low in hydrolytic acidity. The acid soils (HL and AL), poor in humus and organic phosphorus, proved to have a low total phosphatase potential (0.33 mgP and 0.22 mgP respectively).

Soil type	Total phosphatase potential (mg-P)	Phosphomo-noesterasic potential (mg-P)	Organic phosphorus (mg)	Humus (%)	Hydrolytic acidity (Ha-me)
Vermic-calcic chernozem (VCC)	1.62 a	84.48 b	6.11 a	1.56 a	1.23 d
Haplic chernozem (HCh)	1.63 a	67.98 c	4.91 b	1.65 a	2.80 c
Haplic luvisol (HL)	0.33 b	122.77 a	0.88 c	0.84 b	7.25 b
Albic luvisol (AL)	0.22 b	85.80 b	0.84 c	0.81 b	8.44 a
LDP 5%	0.324	3.882	0.212	0.1924	0.2133
LDP 1%	0.490	5.878	0.322	0.2913	0.3233
LDP 0.1%	0.788	9.443	0.517	0.4680	0.5190

Table 1. Phosphatasic level of some soils with different chemical reactions and the level of some agrochemical indicators

Notes: Values relate to 100 g of soil. The following methods were used: total phosphatase potential - method described in this paper; phosphomonoesterasic potential - Kroll and Kramer (1955); organic phosphorus (Legg and Black, 1955); humus content (Graham, 1950 as adapted by Salfeld, 1974); hydrolytic acidity (Kappen, 1931).

Values followed by the same letter are not significantly different at $p = 0.05$.

Another response was obtained by the phosphomonoesterase potential. In this case, the reaction mixture is supplied with di-natrium phenylphosphate as the enzymatic substrate and, naturally, higher quantities of P were released but these express the effect of phosphomonoesterase only, independently of the original phosphorus contents of the soils. What is important to emphasise is that, on the one hand, there is a positive and significant correlation between the content of organic P in the soils and the P released enzymatically by the total phosphatasic potential method (Figure 1A) but no such trend is exhibited by the phosphomonoesterase potential method (Figure 1B).

Fig. 1A-Correlation between organic phosphorus and total phosphatase potential

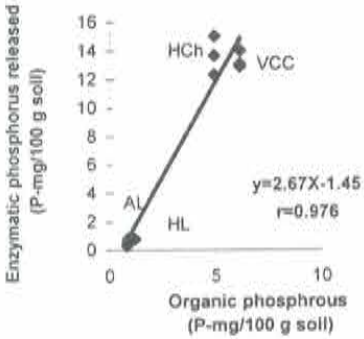


Fig.1B-Correlation between organic phosphorus and phosphomonoesterasic potential

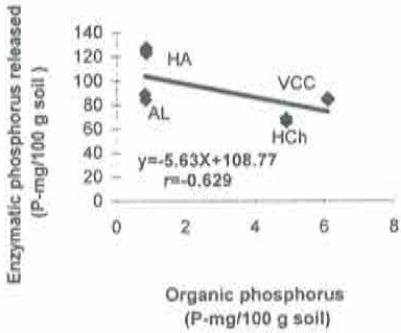


Fig.2 A-Correlation between humus and total phosphatase potential

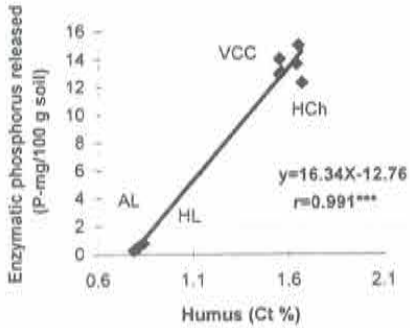


Fig.2B-Correlation between humus and phosphomonoesterasic potential

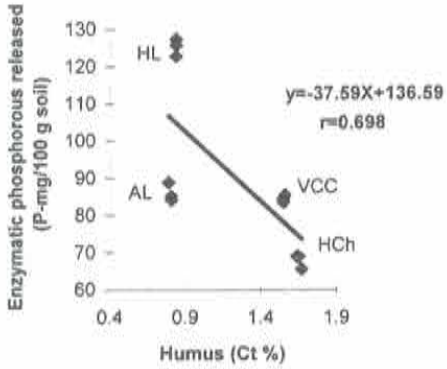


Fig. 3A-Correlation between hydrolytic acidity and total phosphatase potential

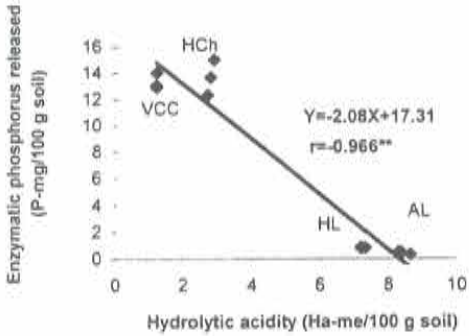
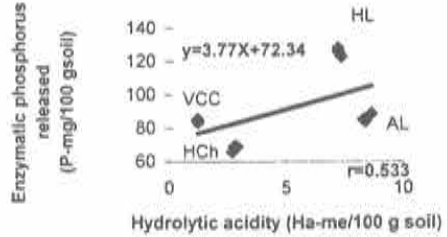


Fig. 3B.Correlation between hydrolytic acidity and phosphomonoesterasic potential



The difference between the two methods is more evident when examining the correlation between humus and the phosphorus enzymatically released. The total phosphatasic potential method yields a significant positive correlation (Figure 2A) whereas no such correlation exists for the phosphomonoesterase potential method (Figure 2B).

Discussion

A very important point of discussion is the influence of pH on soil phosphatase activity. Using same substrate, di-natrium phenylphosphate, the acid phosphomonoesterase is more active in acid soils and the alkaline phosphomonoesterase is more active in alkaline soils. Thus, there are different phosphatases in soils and the phosphomonoesterase method promotes only some of these, depending on the soil type. In Figure 3A, the true phosphatasic potential, determined by the total phosphatase method described here, is shown to have a very significant negative correlation with the hydrolytic acidity of the soil whereas an opposite trend arises with the phosphomonoesterase method.

Conclusions

Comparing the results of the two methods shows the superiority of the new method for determining soil phosphatase activity.

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INVESTIGATIONS OF SOIL EROSION IN LITHUANIA

Lithuania is a lowland country. There is the island-like Zhemaiciai upland in the western part of the Republic and the edge of the Baltic upland in the eastern and southern parts. Some 52 per cent of Lithuania's terrain are rolling-hilly relief, where the soil is erodible (Kudaba, 1983).

The intensity of soil erosion in Lithuania depends on tillage (mechanical) erosion. This kind of soil erosion was comprehensively investigated by Kiburys (1989). The extent of soil destruction and translocation under the tillage erosion depends on the slope gradient, tillage equipment (plough, cultivator, harrow and other) and the direction of tillage operations. Using tillage equipment the farmer creates the favourable conditions for water and wind erosion. The main results of investigations were presented by Professor Benjaminas Kiburys at the International Symposium on *Tillage Translocation and Tillage Erosion*, July 24-25, 1997 in Toronto, Canada. There were four presentations by Professor Kiburys in this Symposium, one with co-author Benediktas Jankauskas. The main oral presentation was on *Mechanical soil erosion in hilly agrarian landscapes: the problem and new approaches to prevention and rehabilitation.*

Investigations of soil erosion by water have been concentrated at the Kaltinenai and Dukstas Research Stations of the Lithuanian Institute of Agriculture. These Research Stations have been in existence since 1960. The oldest soil erosion monitoring sites still extant have been operating since 1960 at the Dukstas Research Station. There are monitoring sites with bare fallow, grain crops, grasses and wasteland (untilled/ uncultivated land). The research data of the Dukstas Research Station represent the soil and climatic conditions of the Baltic Uplands. The losses of clay loam soil due to water erosion (Bieliauskas, 1985; Svedas, 1974) on the hill slopes of Eastern Lithuania show a wide range (Figure 1).

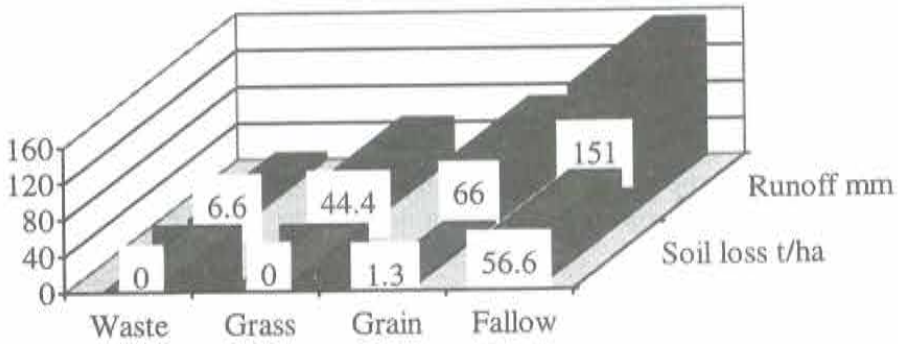

Figure 1. The losses of soil and runoff water on the slopes of Baltic uplands. The average annual data of 1961-1979.

According to data from the long-term monitoring sites of the Kaltinenai Research Station in the Zhemaiciai upland (Jankauskas, 1996), heavy losses of Dystric Podzoluvisols occur due to water erosion. On slopes of 2-14° the losses of soil were as follows: 3.5-10.8 m^3 ha^{-1} under winter rye, 11.7-38.0 m^3 ha^{-1} under spring barley, and 28.8-119.6 m^3 ha^{-1} under potatoes. The perennial grasses completely stopped soil erosion (Figure 2).

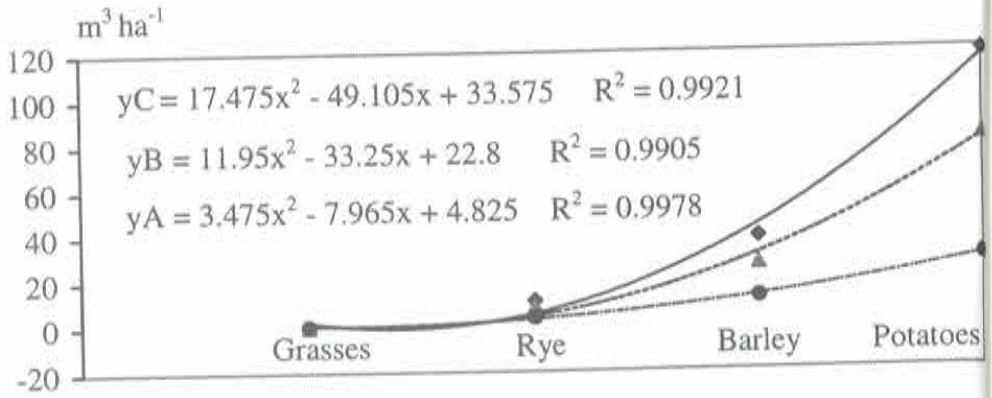

Figure 2. The rates of soil erosion by water under different plant covers on various slope inclinations

Note: A. 2-5°, B. 5-10°, C. 10-14°

Soil erosion has led to significant deterioration in the agrophysical and agrochemical attributes of loamy sand and clay loam Podzoluvisols. The dry bulk density and percentages of clay-silt and clay fractions have increased and the percentage of total porosity and water field capacity have decreased. Strong acidity of E, EB and B1 soil horizons, uncovered to surface, is a characteristic feature of eroded Podzoluvisols. Deterioration of soil attributes leads to a decrease in soil fertility. The natural fertility of differently eroded soils on the slopes of 2-5°, 5-10° and 10-14° has decreased by 21.7-22.1%, 38.9-39.7% and 62.4%, respectively (Figure 3).

Erosion-preventive six-course crop rotations have been investigated at Kaltinenai Research Station since 1983. Losses of soil under erosion-resisting grass-grain crop rotations decreased by 77.4-80.7% in comparison with the field crop rotation (Figure 4), while on the grain-grass crop rotation they decreased by 21.5-24.6% (Jankauskas, 1997; 1998).

According to our investigations, even grass-grain crop rotations could not completely stop soil erosion. The annual rates of soil loss by water erosion were 9.4-9.7 t ha^{-1} on the slope of 10-14°, 6.0-6.2 t ha^{-1} on the slope of 5-10°, and 2.8-2.9 t ha^{-1} on the slope of 2-5° gradient. Therefore we recommended grassing of slopes over 10° and using erosion-prevention tillage with fertilising and liming on the slopes of 2-10°

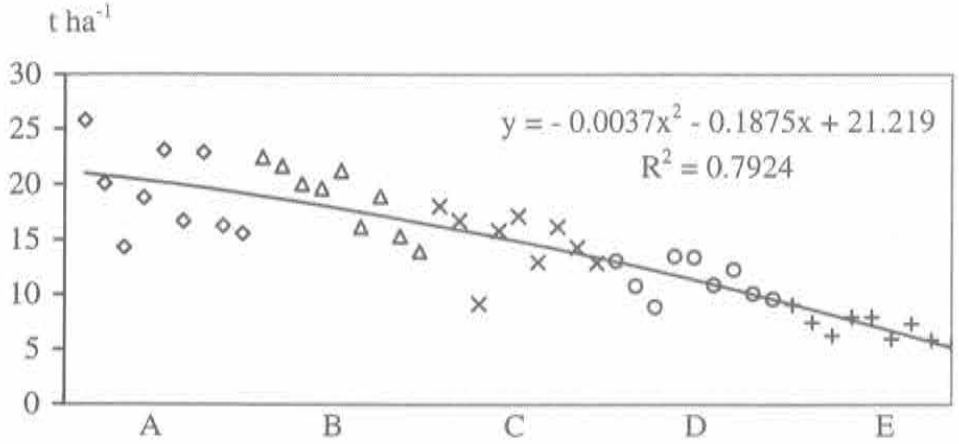

Figure 3. Dependence of spring barley yield (y) on the slope gradient and degree of soil erosion
Note: A. Depositional footslopes. B. Plains: conditionally non-eroded soil. C. Slopes of 2-5°: slightly eroded soil. D. Slopes of 5-10°: moderately eroded soil. E. Slopes of 10-14°: severely eroded soil.
y = the three-year average of grain and straw grass yield.

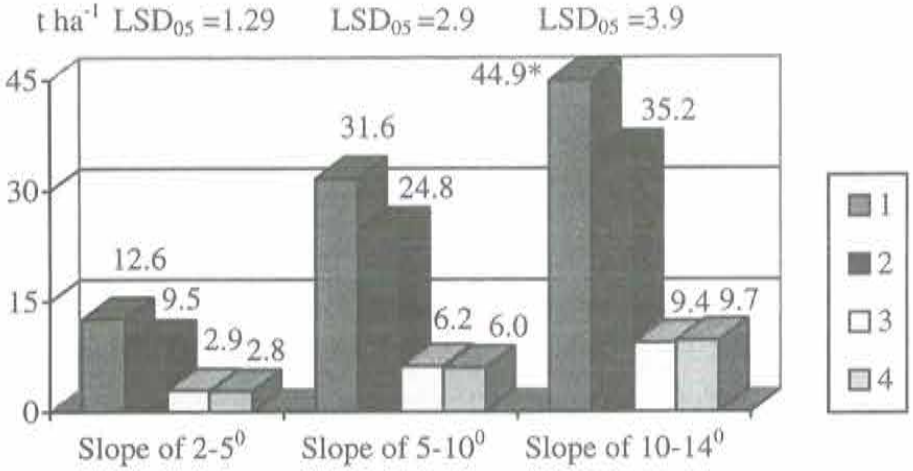

Figure 4. The average annual (1983-1994) rates of soil erosion by water under different crop rotations

Notes: Crop rotations: 1. Field; 2. Grain-grass; 3. Grass-grain with clover; 4. Cereal grass-grain.
** Perennial grasses of multiple composition were grown instead of the field crop rotation. Data were calculated by the method of group comparisons*

in addition to erosion-preventive crop rotations. In the autumn soil tillage system, deep soil chiseling can be used instead of deep mouldboard ploughing, and spraying the stubble with the herbicide 'Utal' can be used instead of stubbling and deep ploughing. With these practices rates of soil erosion were reduced by 1.6 and 8.9 times respectively, while productivity remained at the same level (Feiza and Arlauskas, 1995). Differentiation of nitrogen fertiliser rates on various parts of the hilly-rolling uplands (Feiziene, 1996) and the combination of fertilising and liming of eroded acid soils (Jankauskas, 1996) are also important parts of the erosion control system.

We have already formed the conservation cropping system for hilly-rolling relief in Lithuania (temperate climate zone) that will enable sustainable land use (Jankauskas, 1996). Two of our research programmes (operated by the author and G.Jankauskiene) have been incorporated into the Core Research Programme of the GCTE (Global Change Terrestrial Ecosystem) Soil Erosion Network, which is a part of the IGBP (International Geosphere-Biosphere Programme).

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WATER CONSERVATION BY SOIL CONSERVATION, INTERNATIONAL CONFERENCE HEADWATER '98, MERANO, APRIL, 1998

The International Conference on *Headwater Control IV: Hydrology, water resources and ecology in headwaters* took place on 20-23 April 1998 in Merano, North Italy. The Conference was organised by the European Academy, Standing Committee on Headwater Control; the International Association of Hydrological Sciences and the International Committee on Mountain Hydrology. The Chair of the Organising Committee was Ulrike Tappeiner. The Conference brought together over 260 scientists, government representatives, and representatives of national and international organisations from 47 countries. Fifteen topics of headwater control were discussed, including such important ones for soil scientists as:

- Soil-plant-water-atmosphere interactions (Chair: Alfred Backer),
- Degradation and recovery (Chair: Martin J. Haigh),
- Terrestrial ecology and limnology (Chairs: James W. Ward and Rosario Mosello),
- Assessment of environmental impacts (Chair: Andrej Hocevar),
- Better understanding of the role of vegetation cover (Chairs: Lorenzo Marchi and Josef Krecek),
- Catchment and streamflow hydrology (Chairs: George Leavesley and Erich Plate), and
- Socio-economic aspects and management (Chair: Hans-Peter Nachtnebel).

The presentations and posters introduced at the Headwater Conference were published in three volumes:

Tappeiner, U., Ruffini, F.V. and Fumai, M. (eds.), 1998. *Hydrology, water resources and ecology of mountain areas*. European Academy, Bozen/Bolzano.

Haigh, M.J., Krecek, J., Rajwar, G.S. and Kilmartin, M.P. (eds.), 1998. *Headwaters: water resources and soil conservation*. Proceedings of Headwater '98, the Fourth International Conference on Headwater Control, Merano, Italy, April 1998. Balkema, Rotterdam/Brookfield.

Kovar, K., Tappeiner, U., Peters, N.E. and Craig, R.G. (eds.), 1998. *Hydrology, water resources and ecology in headwaters*. IAHS Publication No.248. IAHS Press.

Many of the presentations published in the volume edited by Martin Haigh et al. relate to the ESSC Task Force on water conservation by soil conservation. This book is both interesting and valuable not only for hydrology specialists and water conservationists but also for pedologists and soil conservationists. Professor Haigh writes in the preface of the book:

Headwater Control is founded in the belief that: i) headwaters are fragile environments and threatened by human action, ii) that direct intervention can mitigate these impacts, and iii) that solutions demand the practical application of co-ordinated and integrated environmental management.

These ideas are reflected in the six parts of the book:

Keynote papers (contains 2 keynote presentations),
Water quality (contains 17 papers),
Runoff (contains 6 papers),
Soil and water conservation (contains 10 papers),
Bioengineering (contains 2 papers),
Sustainable headwater management (contains 8 papers).

The volume contains the more important, action-oriented reports that relate to improved water quality, water resource management through soil erosion control, soil conservation through better understanding of the role of vegetation cover, and effective integrated land management. Many of the presentations are based on meticulous and long-term investigations, with large investments in fieldwork and environmental monitoring. The target of the authors is the deepest, locally-integrated understanding of headwater processes, their management and their reciprocity with soil conservation, and the stabilisation of soil erosion processes. The most important papers are:

Wade, A.J. et al. Impacts of land use and flow on nitrate concentrations and fluxes of an upland river system in Worth, East Scotland.

Fullen, M.A. et al. Soil erosion and conservation in the headwaters of the Yangtze River, Yunnan Province, China.

Haigh, M.J. et al. Headwater control: matters arising.

Thornton, G.J.P. Chemical composition of the streams draining the English Lake District: relationships between stream chemistry and catchment characteristics.

Kostadinov, S. et al. Runoff regime in small watersheds with different degrees of forest cover.

There is also my paper on Soil erosion under different crop rotations, Zhemaichiai upland, Lithuania.

The Conference was a remarkably well-organised international, interdisciplinary forum.

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EUROSOIL 2000

The European Society for Soil Conservation is in discussions with the British Society of Soil Science on their proposed organisation of a conference in the UK in the year 2000. A three-day meeting is envisaged covering a wide range of specialist topics relevant to the whole of Europe.

The ESSC wishes to collaborate with BSSS in this venture whilst ensuring that it does not clash with the proposed Third Congress of the European Society for Soil Science to be held in the same year in Spain (see preliminary announcement on p. 24).

Further information on venue, dates and topics for EUROSOIL 2000 will be given in later Newsletters.

EROSION PREDICTION MAPS AT 1:5000 FOR LAND RECONSOLIDATION PLANNING AND AGRICULTURAL ADVICE

Changes in land use during the last few decades have increased soil erosion in Germany. The differentiated Universal Soil Loss Equation (dUSLE) was developed to aid land reconsolidation planners and agricultural advisors in the assessment of appropriate methods of erosion control. The dUSLE has been used by the Bavarian Agricultural Advisory Service since the early 1980s. Due to continuous improvement, the method has now gained a high degree of practical suitability and prediction accuracy. A handbook has been recently compiled describing the procedure in detail, from data acquisition to the interpretation of the resulting maps.

The dUSLE combines the USLE with a Geographic Information System (ARC/ INFO). This combination allows one to compute maps showing predicted rates of sheet and rill erosion with high resolution (mostly < 100 m^2). The method only uses input information which is readily available in Germany. The map outputs can be varied according to their intended use: e.g. maps showing where tolerable soil loss is exceeded under current land use, or maps of tolerable slope lengths to help in the redesign of field structures during land reconsolidation work. The latter show where existing structures like lynchets have to be preserved for erosion control while others may be removed to make agricultural operations easier. Maps of a tolerable crop rotation can be used by agricultural advisors to show which rotations and management practices are possible without exceeding tolerable soil loss. In addition, several other useful maps may be created once the input data have been collected.

The handbook, *Erosionsprognose-Karten im Maßstab 1:5000*, is available (in German only), price DM 10.00, from: Landesanstalt für Bodenkultur, Dokumentation, P O Box, D-85350 Freising, Germany.

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NEW PUBLICATIONS

***The soil as a strategic resource: degradation processes and conservation measures.* Edited by A.Rodríguez Rodríguez, C.C.Jiménez Mendoza and M.L.Tejedor Salguero. Geoforma Ediciones, Logroño, Spain, 1998.**

The book contains 41 papers chosen from the 111 contributions presented at the meeting in the Canary Islands (Tenerife, Lanzarote and Fuerteventura) in July 1995, organised by the Departamento de Edafología y Geología de la Universidad de La Laguna, under the auspices of the European Society for Soil Conservation (ESSC).

As indicated by Dr José L. Rubio, then Vice-President of the ESSC,

> *". . . the most popular concept of soil quality [is] based on its multifunctional character that can be described in terms of combinations of edaphic properties related to the soil function. . . . In this concept, the soil represents the upper layer of the earth's surface which functions and serves as a support and sustenance for most of the activities that take place in the biosphere."*

Consequently, in certain situations, the soil becomes a strategic resource for the survival of the population, in the same way as potable water and clean air. It is therefore necessary to know the dynamics of the processes responsible for soil degradation as well as the causal factors, in order to establish suitable measures for the prevention of soil degradation, or, where necessary, for the recovery, regeneration or rehabilitation of degraded soils.

The book is arranged in four sections:

Section A: Water and wind erosion processes and other processes of physical degradation as a consequence of the abandonment of traditional agricultural practices.

This section is introduced by A.Rodríguez Rodríguez, C.C.Jímenez and M.L.Tejedor who provide a state-of-art presentation on soil degradation and desertification in the Canary Islands. The 18 papers that follow cover an assessment of the efficiency of erosion control measures; the relationship between erosion processes and the state of the soil surface and biological activity; the effects of erosion on nutrient loss, organic material and fine soil fractions; physical soil properties and soil compaction; the influence of tillage on wind erosion and wildfire on water erosion; and different methods of assessing water erosion, including the use of GIS, the USLE, experimental plots, simulated rainfall and hydrographic information.

Section B: Salinisation-sodification processes related to irrigated agriculture and the use of low quality water.

After an introducetion by T.Tóth and L.Blaskó, with a paper on the problems of secondary salinisation caused by irrigation using examples from Hungary, five papers deal with regional studies of salinisation, process modelling, the physical properties of salt-affected soils and aridization.

Section C: Chemical pollution and acidifcation (CTB) as a consequence of the intensification of agriculture.

An introductory article by J.E.García Hernández abd R.Díaz Díaz describes the processes involved in the mobilisation of soil pesticides in the environment and recent theories about modelling them. The other seven articles in this section cover the dynamics of some soil contaminants (arsenite, aluminium, selenium, herbicides); the agricultural use of contaminated soils; and a study of a 'hot spot' for a chemical time bomb.

Section D: Measures of environmental protection of soil and water conservation practices in fragile ecosystems.

Introduced by I.Plá Sentis with a presentation on modelling hydrological processes as a base for the implementation of soil and water conservation measures, the eight papers in this section tackle the use of sewage sludge and fishing industry residues for improving degraded soils; conservation tillage; conservation measures on abandoned fields; the evolution of physical properties of soils affected by forest fires; the application of land use methodology; and the development of a soil degradation index.

The book represents an important contribution from researchers in Mediterranean countries to the understanding of soil degradation processes and is an indicator of the extraordinary vitality of the ESSC.

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Development and implementation of soil conservation strategies for sustainable land use. ***Soil and Tillage Research*** **46: 1-134.**

In September 1996, the European Society for Soil Conservation held its Second International Congress at the Technical University of Munich in Freising-Weihenstephan. The results of the panel discussion of this conference and selected presentations have now appeared as a peer-reviewed special volume of *Soil and Tillage Research*. The papers cover soil conservation projects in the USA and The Netherlands; soil translocation into wetland depressions in Germany; the effect of political and economic constraints on the implementation of erosion control; the benefits of grass ley set-aside and gravel mulching; spatial and temporal variations in erodibility including scale effects; the effect of rock fragment characteristics; and the development of an equation of soil detachment by flow.

A final panel discussion aimed at summarising the experiences of ESSC members with their contrasting regional and scientific background. Besides soil erosion, the problems of soil compaction and structural deterioration, soil pollution and soil consumption and urbanisation were treated. Despite this broad scope, the contributors to the panel came to a remarkable unanimous judgement of the present situation. They concluded that the causes and processes leading to the problems are known sufficiently well to put better soil use into effect. No major improvement in the endangering of soils can therefore be expected from process research aimed at an isolated problem. Most impacts were classified as irreversible within the human time scale. This demands an immediate control of the problems. Methods are available; the major drawback is their lack of acceptance for all types of problems and irrespective of the regional context. Six reasons for this were identified. They are explained, together with a more detailed description of the judgement of the panel, in the introductory article of the volume.

The special issue reflects the scientific scope of the members of the ESSC. It also demonstrates that the ESSC fulfills its task as outlined in its statutes in coordinating the efforts of all parties involved in soil conservation.

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SOIL CONSERVATION IN LARGE-SCALE LAND USE
Bratislava, Slovakia, May 12-15, 1999

The meeting aims to discuss the issues of soil quality and soil protection under all forms of large-scale land use (agricultural, forest and mixed), including soil management and international and national legislative measures.

Main topics:
(1) physical destruction of soil and relief under large-scale farming; (2) physical destruction of soil and relief in forest land management; (3) chemical and biological soil deterioration; (4) soil conservation legislative, social and environmental aspects.

Programme:
May 12: Registration (08.30), opening ceremony, plenary sessions.
May 13: Plenary sessions.
May 14: Plenary sessions in morning; afternoon free for sightseeing.
May 15: Full day excursion to see pedological and geomorphological effects of soil erosion.

Submission of papers:
Abstracts: to be sent by 31 December 1998. Announcements of papers accepted for presentation will be sent before 31 January 1999.
Full papers: to be sent before 31 March 1999.

Registration:
US$ 120.00 for ESSC Members
US$ 150.00 for non-ESSC Members
Payment must be received in advance before 31 March 1999. Only those authors who have paid will have their papers published.

Accommodation:
Conference hotel (3-star): single room - 600 SKr; double room - 800 SKr per night.
Meals: allow US$ 15-20 per day.

Further information: Dr Pavel Jambor, Soil Fertility Research Institute, Gagarinova 10, 827 13 Bratislava, Slovakia.

- **4-9 July 1999 - Fifth international meeting on soils with Mediterranean type of climate (IMSMTC)**
Barcelona, Spain

The goal of the meeting is to synthesize the view of soil as an agricultural resource with the view of soil as an essential component of the broader environment, including water and air. Main themes: genesis, properties, classification, fertility and conservation of soils in regions with a Mediterranean climate. Topics include soil degradation (erosion, pollution, depletion of organic carbon, salinization); soil resilience; soil restoration (remediation, revegetation). In addition to papers on the Mediterranean area, contributions are welcome relating to California, Chile, South Australia and South Africa. Language of the Conference is English.

Registration: special rates before 30 January 1999 - Ptas 50,000 (members of ISSS, SECS, ESSC); Ptas 56,000 (normal); Ptas 22,000 (students). Fees include conference dinner. Post-meeting tour: Ptas 8,000.

Deadlines: Abstracts - 30 November 1998.

Further details from: Prof J.Bech, Chair of Soil Science, Department of Plant Biology, Faculty of Biology, University of Barcelona, Avenida Diagonal 645, E-08028 Barcelona, Spain.

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Note: The ESSC is a sponsoring partner of this meeting. Reduced registration fees are available for ESSC members.

- **20-23 September 1999 - Food and forestry: global change and global challenges. The GCTE Focus 3 Conference.**
University of Reading, UK

Meeting designed to report progress in the major research areas of global change impacts on: major monocrops and pasture and rangeland production; pests, diseases and weeds; soils; multi-species agroecosystems; and managed forests. Conference themes: (1) environmental consequences of increasing food, fibre and fuel supply; (2) climate variability and food and fibre production; (3) scaling-up from plot to region

for crops, forests, rangelands and pastures, pests and diseases, soil organic carbon and erosion; (4) linking nutrient and water dynamics into predictions of crop, pasture and forest production; (5) incorporating effects of pests, diseases and weeds into crop, pasture and forest production models; (6) predicting future production areas from models of land-use change.

Conference includes plenary sessions, parallel seminar-cum-workshop sessions and two keynote contributed papers on: (1) environmental consequences of increasing supply; and (2) climate variability and food and fibre production.

The meeting is organised in association with *Agriculture, Ecosystems and Environment*. Edited papers will be published in a special edition of this journal.

Abstracts: Not exceeding 300 words to be submitted by e-mail (or on disk) in Microsoft Word (Version 6.0 or lower), WordPerfect, as a text attachment or in the main body of the e-mail (hard copy also to be sent by mail) before 30 November 1998.

Further details from: Sarah Wilkinson, Food and Forestry: Global change and global challenges, Conference Secretariat, Elsevier Science, The Boulevard Langford Lane, Kidlington, Oxford OX5 1GB, UK.
tel: +44 - 1865 - 843691
fax: + 44 - 1865 - 843958
e-mail: sm.wilkinson@elsevier.co.uk
http://www.elsevier.nl/locate/gcte99

- **8-11 May 2000 - International Conference on The future of the Mediterranean rural environment: prospects for sustainable land use and management**

International Agro-Hydrology Research and Training Centre, Menemen, near Izmir, Turkey

Conference aims to identify future strategies of sustainable land use and management in the Mediterranean rural sector by examining processes of political, socio-economic, technological and biophysical change in an integrated manner. The event will bring together individuals from the research, policy-making and private sector communities.

Major themes are: (1) Socio-economic change, e.g. migration, abandonment, globalisation; (2) Physical change, e.g. climatic change, land degradation, water resources and quality; (3) Technological change, e.g. plant breeding, precision farming, irrigation management.

Abstracts: about 300 words to be submitted before 1 May 1999.

Further details from: Gill Burrows, Cranfield University, Silsoe, Bedford MK45 4DT, UK
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AIMS OF THE SOCIETY

The ESSC is an interdisciplinary, non-political association, which is dedicated to investigating and realising soil conservation in Europe.

The ESSC pursues its aims in the scientific, educational and applied sectors
- *by supporting investigations on soil degradation, soil erosion and soil conservation in Europe,*
- *by informing the public about major questions of soil conservation in Europe,*
- *by collaborating with institutions and persons involved in practical conservation work in Europe.*

The ESSC aims at co-ordinating the efforts of all parties involved in the above cited subjects: research institutions; teachers and students of geo-sciences, agriculture and ecology; farmers; agricultural planning and advisory boards; industries and governmental institutions.

ZWECK DER VEREINIGUNG

Die ESSC ist eine interdisziplinäre, nicht politische Vereinigung. Ihr Ziel ist die Erforschung und Durchführung des Schutzes der Böden in Europa.

Die ESSC verfolgt dieses Ziel auf wissenschaftlichem, erzieherischen und angewandtem Gebiet
- *durch Unterstützung der Forschung auf den Gebieten der Boden-Degradierung, der Bodenerosion und des Bodenschutzes in Europa,*
- *durch Information der Öffentlichkeit über wichtige Fragen des Bodenschutzes in Europa,*
- *durch Zusammenarbeit mit Institutionen und Personen, die an der Praxis des Bodenschutzes in Europa beteiligt sind.*

Die ESSC will alle Personen und Institutionen zusammenführen, die sich für die genannten Ziele einsetzen: Forschungsinstitutionen, Lehrer und Studenten der Geowissenschaften, der Landwirtschaftswissenschaften und der Ökologie, Bauern, landwirtschaftliche Planungs- und Beratungsstellen, Industrieunternehmen und Einrichtungen der öffentlichen Hand.

BUTS DE L'ASSOCIATION

L'ESSC est une association interdisciplinaire et non politique. Le but de l'association est la recherche et les réalisations concernant la conservation du sol en Europe.

L'ESSC poursuit cette finalité dans les domaines de la recherche scientifique, de l'éducation et de l'application:
- *en encourageant la recherche sur la dégradation, l'érosion et la conservation du sol en Europe,*
- *en informant le public des problèmes majeurs de la conservation du sol en Europe,*
- *par la collaboration avec des institutions et des personnes impliquées dans la pratique de la conservation du sol en Europe.*

L'ESSC souhaite favoriser la collaboration de toutes les personnes et institutions poursuivant les buts définis ci-dessus, en particulier: institutions de recherche, professeurs et étudiants en géosciences, des agriculteurs, des institutions de planification et des conseil agricole, de l'industrie, et des institutions gouvernementales.

OBJETIVOS DE LA SOCIEDAD

La ESSC es una asociación interdisciplinar, no-política, dedicada a la investigación y a la realización de acciones orientadas a la conservación del suelo en Europa.

La ESSC persigue sus objetivos en los sectores científicos, educacionales y aplicados, en al ámbito europeo:
- *promocionando la investigación sobre degradación, erosión y conservación de suelos,*
- *informando al público sobre los principales aspectos de conservación de suelos,*
- *colaborando con instituciones y personas implicadas en la práctica de la conservación de suelos.*

La ESSC aspira a coordinar los esfuerzos, en los temas arriba mencionados, de todas las partes implicadas: centros de investigación, profesores y estudiantes de geo-ciencias, agricultura, selvicultura y ecología, agricultores, servicios de extensión agraria, industrias e instituciones gubernamentales.

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