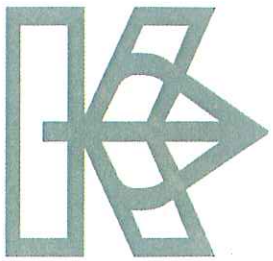

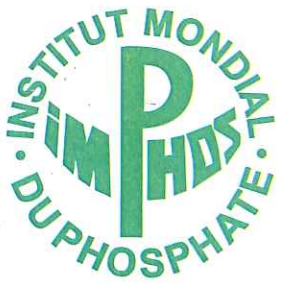

13 – 14 Iulie 2005
Craiova – România

Managementul nutrienților pentru îmbunătățirea calității culturilor și conservarea mediului

M. Dumitru

A. Dorneanu

R. Mocanu

D. Gheorghe

BUCUREȘTI 2006

INTERNATIONAL SYMPOSIUM

"Management of Nutrients for Crop Quality Improvement and Environmental Conservation"

ORGANIZED BY

INTERNATIONAL POTASH INSTITUTE (IPI)

THE WORLD PHOSPHATE INSTITUTE (IMPHOS)

NATIONAL RESEARCH – DEVELOPMENT INSTITUTE FOR SOIL SCIENCE, AGROCHEMISTRY AND ENVIRONMENTAL PROTECTION (ICPA)

ROMANIAN NATIONAL BRANCH OF CIEC

CRAIOVA UNIVERSITY

July 13 – 14, 2005

CRAIOVA – ROMANIA

ORGANIZING COMMITTEE

Prof. dr. Mihail DUMITRU	**Director, National Research - Development Institute for Soil Science, Agrochemistry and Environmental Protection, Bucharest**
Prof. dr. Romulus MOCANU	**Professor, Craiova University**
Dr. Boujamâa AMAR	**- IMPHOS, Casablanca Morocco**
Dr. Thomas POPP	**- IPI, Basel Switzerland**
Dr. doc. Aurel DORNEANU	**Secretary, Romanian National Branch of CIEC**
Dr. Dumitru GHEORGHE	**Director, SCDCPN Dabuleni**
Ing. Maria SCHUTZ	**Director, S.C. GINI TRANSCOM S.R.L. Craiova**
Dr. Catalin ROSCULET	**Director, SCDA Caracal**

Symposium is organized under the patronage of the ACADEMY OF AGRICULTURAL AND FORESTRY SCIENCES "Gheorghe Ionescu – Şişeşti".

Symposium objectives

- **Debate on nutrient management in agricultural systems with a special view on phosphorus and potassium.**
- **Presentation of knowledge level on management of nutrients and their effect on crop quality.**
- **Importance of nutrient management and its consequences on environment.**

ABSTRACTS

Oral presentation

NEW ASPECTS REGARDING THE DEVELOPMENT OF HOME ASSORTMENT OF CHEMICAL FERTILIZERS IN PERSPECTIVE OF ROMANIA'S INTEGRATION IN EUROPEAN UNION

N. Dimcev[1], A. Dorneanu[2], Tigãnas[2], I. Stoleriu, N. Mihai, D. Ungureanu, O. Tabãrã, M. Ogrodnic

[1)]IPROCHIM Bucharest; [2)] ICPA Bucharest; [3)]SC Azomureş SA; [4)]SC Sofert SA; [5)]SC Doljchim SA; [6)]SC Turnu SA; [7)]SC Amonil SA

The impetuous development of world economy and policy more and more accentuated globalization will lead to increased exigencies for free market and elimination of technical barriers in circulation of goods.

Chemical fertilizers represent a category of products with a very large market and diversified from the viewpoint of production, manipulation, transport, storage as well as some risks regarding the environmental quality and people security.

The EU legislation by regulation 2003/2003 has a technical and adequate content as a legal instrument, stipulating precise conditions which should be applied simultaneously all over the countries in EU as concerns the free circulation of chemical fertilizers.

The assortment of chemical fertilizers manufactured at present and on medium term in Romania was diversified and/or restructured by the home economic agents.

Given these new conditions, the present paper will define the conditions under which the technical characteristics offered by the Romanian producers correspond to the requirements of the new EU rules.

THE ROLE OF PHOSPHORUS AND POTASSIUM IN AGROCHEMICAL OPTIMIZATION OF SOIL-PLANT SYSTEM

Mihai Rusu, Marilena Mărghitaş, Tania Mihăiescu

University of Agricultural Sciences and Veterinary Medicine

The paper presents clearly the two primary macro elements involving in agrochemical optimization of soil-plant system.

In the first part it is estimated the effect of soil phosphorus content enrichment in the nitrogen metabolization and in the preventing of some excess and nitric toxicity states of crop fields. In this context the soil reaction ameliorative measures and of long time stabilization of accessible phosphorus concentration (first of all by superphosphate) ensure an accumulation and a normal evolution of the nitrogen forms and in the end, the proteic forms synthesis.

Practically, it is reconsidered the effect of mineral neoccluded forms of phosphates (P-Al, P-Fe, P-Ca) in optimization of soil phosphate regime as a durable support of fertility.

In the second part of the paper it is approach the assessment of applied potassium suitability in connection with specific and global crops demand but also in the context of a differentiated dynamics between the exchangeable and fixed forms (interlayer) of this cation.

It is proposed, on these databases, the introduction, in usually agrochemical studies, of some indicators, that report the content of potassium mobile forms (exchangeable) to the total cation-exchange capacity (T) and to the potassium soil buffering capacity.

The presented paper is based on experimental multi-annual data, in permanent site and agrochemical soil and plant analysis.

THE PHOSPHORUS AND POTASSIUM SUPPLYING OF THE SOILS FROM THE DOLJ DISTRICT

Nicolae Giugea, Cornel Popa, Stefan Pavel, Ana Maria Mocanu

Craiova University

The Dolj district is located as an amphitheatre within the south-western part of Romania and has a wide range of soils belonging to 6 classes and 18 types. The most important is the luvisoils class with the following types: preluvosoil, luvosoil and planosoil which occupy 26.2 % of the district surface and the cernisoils class with the following types: kastaniozoms, chernozems and faeziems which occupy 35.8 % of the district surface. The smallest surface of the district is occupied by the sols odisoils class: solonchek and solonetz – 0.2 %.

The cropping land of the Dolj district is 585,756 ha which includes: 2,952 ha meadow, 18,260 ha vineyards, 8,352 ha orchards.

The reaction of the soils from Dolj district can be characterized as follows: strong acid 1.8 %, moderately acid 21.8 %, weak acid 52.6 %, neutral 7.3 %, weak alkaline 16.1 %, strong alkaline 0.4 %.

The phosphorus supplying is somehow deficient: 17 % of the district cropping surface is very weakly supplied with phosphorus, 15 % weak supplied, 40 % average supplied and only 11 % good supplying and 9 % very good phosphorus supplying.

Also, the potassium supplying degree is important: 10 % of the district cropping surface is very weakly supplied with potassium, 28 % average supplied, 45 % good supplying and 18 % very good potassium supplying.

Within the last 15 years there were used no direct phosphorus and potassium chemical fertilizers but only complexes fertilizers on the Dolj district soils.

NATURAL FERTILIZERS - SOURCE OF NUTRIENTS FOR AGRICULTURAL CROPS IN THE ARGEŞ COUNTY

I. Creangă, R. D. Buşu, D.G. Bucur

Argeş Soil Survey and Soil Testing Office

All the agricultural systems (sustainable, conventional, biological, organic agriculture, and precision farming) should take into account to maintain, increase and conserve the soil fertility by a complex of applied technologies. Among these, the natural and mineral fertilizers play a particular role. They should ensure the needed nutrients for cultivated plants, and natural pastures and meadows.

Fertilization should have in view the soil supply level with nutrients as well as the demands of plant for nutrients (NPK), taking into account the planned yields.

In the Argeş County, the predominant low soil supply with organic matter and nutrients, especially N, P and even K, needs an adequate fertilization system where the natural fertilizers (manure, poultry manure, vegetal residues, etc.) should play an important role, having in view their content in organic matter and nutrients.

As a result, by a proper management of natural fertilizers, the soils in the Argeş County may enjoy 1412671 t natural fertilizers mainly generated by the local livestock and poultry in the rural households. The quantity of 7686 t N, 4527 t P and 7076 t K contained in these natural fertilizers, applied every 3 years according to the normal technologies, may fertilize 51000 ha cultivated lands and 11600 ha natural pastures during their grazing season.

THE EVALUATION OF THE PHOSPHORUS AND POTASSIUM RESERVES FROM THE AREALS OF OLTENIA SUBREGION WITH THE PURPOSE OF ADJUSTMENT FOR PRACTISING A DURABLE VITICULTURE

Ion Olteanu, Elena Gavrilescu, Dorin Constantin Costea

Craiova University

The response reactions concerning the growth and fructification of grapevines according to the soil supply levels of phosphorus and potassium are different.

The use of the recommended fertilizers fills up the deficit of phosphorus and potassium when the food demands of grapevines are bigger than the soil reserve. When establishing the doses of chemical fertilizers, the followings are taken into consideration: the soil supplies of nutritive elements that are easily accessible to plants; the grape yield to be obtained and the specific consumption, differentiated upon the production direction and the cultivated species.

The determination of the mineral nutritional condition of grapevines with P and K has allowed the diagnosing of nutritional diseases for the main vineyards in Oltenia.

The optimal soil supply is 10-30 mg P_2O_5, in case of phosphorus, and 20-50 mg K_2O, for 100 g of soil, in case of potassium (Olteanu I., 2000).

The optimal nutritive balance during the vegetation period is provided at an average content of leaves of 0.2-0,5 % P_2O_5 and 1.25 % K_2O in the bunch of grape insertion point.

Based upon the criteria aforementioned the doses of phosphorus and potassium were established with adjustment for every cultivated area, vineyard and parcel. The doses for the fertilisation of fruited vineyards were established in accordance with the soil reserve of mobile phosphorus (P_{AL}) determined by agro-chemical plotting and the grape crop estimated to result.

Within the limits shown, smaller doses are used for table grape species with late maturation and for those destined for high consumption wine, while higher doses are used for table grape species with early, middle maturation and for species intended for superior wines.

Rates of potassium fertilizers used for the fertilisation of fruited grapevines were established in accordance with the soil reserve of mobile potassium (K_{AL}) determined by agro-chemical plotting and the grape crop estimated to result.

Similar with the fertilization based on phosphorus fertilizers, potassium rates within the two limits will be differentiated into inferior levels for grape table species with late maturation and species for current consumption wines, and superior levels for table grape species with early and middle maturation and species for quality wines.

In this paper there are presented the resources on phosphorus and potassium from Dealurile Craiovei, Severinului and Plaiurile Drâncei vineyards.

OPTIMIZATION BY MATHEMATICAL MODELLING OF N, P, K RATES USED TO FERTILIZE THE FRUITING VINEYARDS

Adrian Serdinescu

Research-Development Institute for Viticulture and Vinification –Valea Calugareasca

Operation of a sustainable viticulture implies a dimension of needed chemical fertilizers at the net consumption level of nutrients yearly extracted by vine from soil to develop the yield and afferent vegetative organs for optimizing the quality of grape yield and protecting the viticultural ecosystems.

Research carried out in Valea Calugareasca Centre had in view to rationalize the rates of N, P, K chemical fertilizers used for fertilization of red wine cultivars applying the mathematical modelling based on equations of interaction of nutrition factors. To determine the response of *vinifera* cultivars to the application of different fertilization formulas, a complex experiment scheme

was utilized including N,P, K rates between 50 and 300 kg/ha active ingredient, applied alone and in binary and tertiary combinations.

The elements used to elaborate the mathematical models to calculate the optimum N, P, K rates were: the agrochemical indices relevant for soil (P_{AL}, K_{AL}), yield of grape per hectare, its quality and the action coefficients of nutritive elements in soil and fertilizer.

The calculated optimum rates were positively correlated with vine consumption of nutritive elements and the interaction between the grape yield and coefficient of use of mineral elements, being vice versa proportional with the soil contribution of nutritive elements. The increase of optimum rates at the same time with the increase of grape yield had place by a curve (nomogram) with an ascendant convexity tending to get horizontally at high yield levels.

Depending on the response of *vinifera* cultivars to fertilization (which can be differentiated depending on the eco-climatic conditions specific for each harvest year) revealed by the foliar diagnosis, the recommended rates can be corrected by a foliar diagnosis correction factor which can receive over unitary values (up to maximum 1.4) when nutrition of grape vine is deficient and under unitary when the nutrition is in excess.

INFLUENCE OF K FERTILIZATION ON VEGETABLE

Victor Lăcătuş[1], Lucian Stoian[2],

[1]Research - Development Institute for Vegetables and Flowers, Vidra
[2]Research - Development Station for Vegetables, Bacău

The paper is referring to the K role and importance in achieving some vegetable yields of high quality. There are presented data regarding the negative effect of K deficiency on some qualitative parameters: nitrate accumulation, non-uniform maturity, accumulation of sugars, carotenoids, ascorbic acid, dry mater, etc. Also, references to the increase of resistance of plants to drought, pathogenic and damaging agents.

The paper includes in addition information on the K contents in palatable organs of legumes as well as the specific consumption (between 1.85 and 25.1 kg K_2O/t) and total K contents (between 80 and 288 kg K_2O/ha).

Having in view the moderate supply of soils with exchangeable K and optimum economic rates (75-250 kg K_2O/ha), needed for main vegetable crops, finally, an estimated need of K fertilizers for vegetable in Romania is presented, amounting to 26,400 t.

INFLUENCE OF ROTATION AND FERTILIZATION ON YIELD QUANTITY AND QUALITY OF MAIZE GROWN ON IRRIGATED SANDY SOILS

Dumitru Gheorghe, Mihaela Croitoru

Dăbuleni Research-Development Station for Plant Growing on Sands

Research was carried out on levelled and irrigated sandy soils in southern Oltenia, characterized by a natural low fertility (humus - 0.44-0.58%). The maize was cultivated in monoculture and in rotation for 2, 3 and 4 years. The fertilization was carried out with $N_{75}P_{80}$; $N_{150}P_{80}$; $N_{225}P_{80}$.

The obtained results revealed very significant yield increases (18.3 q/ha) by applying 150 kg N/ha + 80 kg P_2O_5/ha and 28.3 q/ha by applying 225 kg N/ha + 80 kg P_2O_5/ha, respectively.

As concerns the influence of crop rotation, the highest yield increases were obtained with maize cultivated in a rotation of 3 years: winter wheat + beans - maize - peas + green manure, and a rotation of 4 years: winter wheat + green manure - maize - barley + beans - early potatoes + maize. The yield increases reached values of 12.0 q/ha and 11.0 q/ha, respectively.

The production results reveal the higher level of crop rotations on sandy soils as compared to the monoculture.

The research carried out shows that the rotation and fertilization influenced also the maize yield quality.

The best results were obtained with the rotations of 3 and 4 years by applying 225 kg N/ha + 80 kg P_2O_5/ha (9.08% protein, 0.66% P_2O_5 and 0.41% K_2O, respectively).

EVOLUTION OF P MOBILITY ON LONG-TERM EXPERIMENTS WITH N AND K

Radu Lăcătuşu

National Research-Development Institute for Soil Science, Agrochemistry and Environmental Protection, Bucharest

Analytical and statistical data of mobile P, soluble in ammonium – lactate acetate solution (pH 3.7) are presented, which are data specific for long-term intervals, since the initiation of experiments till 2003 or smaller intervals, since few years after experiment organization till 2003.

The processed analytical data are obtained by long-term experiments with N and K on: Albic Luvosoils (Albota, Argeş County), Typical Chernozems (Secuieni, Neamţ County), Cambic (Podu Iloaiei, Iaşi County and Drăgăneşti-Vlaşca, Teleorman County) and Argic Phaeozems (Turda, Cluj County).

The values of statistical parameters, and global and annual coefficients of enriching with P revealed significant differences between the locations of experiments, differences induced by a multitude of factors, among there are: soil homogeneity at the experiment installation, soil nature, physical, chemical and biological properties, but also by the correctitude application of technologies, modalities of samples collecting and analysis, climatic factors, and, finally, by the quantity and quality of yields obtained during the experiment period.

Correlative relations were established between the parameters characteristics for the P mobility and other chemical properties of soils.

MAIZE YIELD, ON DIFFERENT SOIL TYPES, UNDER THE INFLUENCE OF LONG TERM NITROGEN AND PHOSPHORUS FERTILIZATION

Mihaela Lungu[1], Nineta Rizea[1], Rodica Lazăr[1], Beatrice Kovacsovics[1], R. Lăcătuşu[1], Navara Dumitrescu[2], Gh. Burlacu[3], G. Păunescu[4], Cornelia Lupu[5], C. Ailincăi[6]

[1]ICPA Bucharest, [2]SCDA Albota, Argeş, [3]ICDA Fundulea, [4]SCDA Şimnic, [5]SCDA Secuieni, [6]SCDA Podu Iloaiei

Long term nitrogen and phosphorus fertilization differently influenced the maize yield, depending on the soil type. Analytical data were computed, obtained on different soil types, in 2003: Albota Albic Luvosol; Fundulea Haplic Phaeozem; Şimnic Chromic Luvosol; Secuieni, Neamţ Calcic Chernozem; and Podu Iloaiei, Iaşi Haplic Chernozem (WRB-SR, 1998). High yield increases were found, for all studied soil types, when applying nitrogen fertilizers as compared to applying phosphorus fertilizers. The highest outputs were obtained by associating nitrogen fertilizers with phosphorus ones.

The highest yield increases, as a consequence of long term fertilization, were obtained on the Albic Luvosol from Albota, then, in a decreasing order, on the Haplic Chernozem at Podu Iloaiei, on the Haplic Phaeozem at Fundulea an on the Chromic Luvosol at Şimnic. The smallest yield increases were found on the Calcic Chernozem at Secuieni.

SOME ASPECTS REGARDING THE P FERTILIZATION OF SOME FIELD CROPS ON ALLUVIAL SOILS IN "INSULA MARE A BRAILEI"

Dumitru Nastase

Agricultural Research-Development Station, Braila

The P fertilization presents many problems, especially in the last time, regarding both the soil and the plant. This nutrition element, of a particular importance for the metabolism of plants, their growing and development and not only, is one of the chemical elements used in agriculture to which the researchers paid so much attention.

The long-term experiments in Insula Mare a Brailei reveal the particular role of P in achieving sustainable soil fertilization in this agricultural area of high productive potential.

THE EFECT OF THE PHOSPHORUS AND POTASH FERTILISERS ON SEVERAL CROPS ON THE STERILE DUMPS FROM THE HUSNICIOARA – MEHEDINȚI QUARRY

Romulus Mocanu, Ana Maria Mocanu, Mihai Susinski

Craiova University

The sterile dumps resulted after the lignite surface mining from the M.E. Mehedinți has unfavorable physico-chemical features for crops. The soil texture is silt-sandy or sandy, the reaction is weak to moderately alkaline (pH = 7.96 – 9.00), the humus and total nitrogen are extremely reduced (0.2 - 0.4 %), respectively (0.08 – 0.16 %), the accessible phosphorus content is low (0.22 – 29.9 ppm P) also the accessible potassium is low (36.5 – 66.4 ppm K).

All these features show that the sterile dumps have a very low fertility degree, the bonitation mark being 8.16 they belong to the V^{th} category.

The corn crop can give yield on the sterile dumps from Husnicioara only if chemical fertilizer and manure are applied; if no fertilizer applied the yield is nil.

The N_{64}, N_{100}, N_{136}, N_{160} doses applied alone can give average yield on 3 years of 1,315 – 1,898 kg/ha. The applying, besides nitrogen, of phosphorus and potash $N_{136}P_{80}K_{80}$ the yield increases to 2,208 kg/ha. The phosphorus and potash fertilizers determine the increasing of the yield quality, too.

The sunflower can give some yield even without fertilisers but they are small, of 263 kg/ha.

The applying of fertilizers determines the increasing of the yields from 496 to 587 kg/ha when applied nitrogen only and 650 and respectively 853 kg/ha when, besides nitrogen, there were applied phosphorus and potash. The using of manure along with chemical fertilizers determines the doubling of the sunflower yield. The phosphorus fertilizers determine the obtaining of significant yield outputs to peanuts and alfalfa crops too.

SOIL QUALITY SITUATION ON THE P AND K SUPPLY, AND MEASURES FOR ITS CONSERVATION BY SUSTAINABLE VEGETAL PRODUCTION SYSTEMS IN WESTERN ROMANIA

Ion Borza, Dorin Ţărău

USAMVB Timişoara

Soil quality monitoring in western Romania reveals various supplying levels of the agricultural soils with mobile P and K caused by the large variability of present soil types and the applied agricultural system, too.

Also the synthesis of soil testing works offers valuable data on the evolution of P and K supply level. It shows a decreasing tendency as a result of reducing the quantities of organic and mineral fertilizers applied in the last decades, aspect also proved by the results of long term experiments in this zone.

The paper shows the causality relations between these levels and the way of using the fertilizers and amendments, based on the results obtained by long term experiments.

STUDIES ON THE EQUIPMENT FOR THE FOCUSED DISTRIBUTION OF THE CHEMICAL FERTILIZERS OF PHOSPHORUS AND POTASSIUM USED IN THE HOEING CULTURES

Mircea Bădescu

Craiova University

The paper presents the results of the studies which were performed on the equipment for focused distribution, endowed with a cylinder-type distributor with seed cells, which is installed and works at the same time with the sowing machines or the maintenance of the hoeing cultures, in order to improve them.

We have mentioned the results of the comparative tests for four types of distributors when using four sortiments of chemical fertilizers. The processing of the obtained data during the experiments was done by using the modern calculus technique and the EXCEL program. In the synthesis graphs and tables, we have shown the variation of the flow and its instability; lack of uniformity on a longitudinal line; the average quantity of distributed fertilizers; the standard flow; the variation coefficients; the regression curves of the flow.

ACIDS EXTRACTED FROM LIGNITE - AN EXCELLENT FERTILIZER, EXCEPTIONAL AMENDMENT AND MIRACULOUS GRANULATION AGENT.

C. Preda[1)], Emilia Dorneanu[1)], A. Dorneanu[1)], M. Dumitru[1)], I. Nicolaescu[2)]

[1)]ICPA, Bucharest
[2)]Student, Craiova University

Humic acids extracted from lignite as a soluble (alkaline or ammonium) humine or acid form (of desired purity), besides the classical uses (as industrial reagent), also have multiple uses in agriculture and industry of fertilizers.

This paper presents few of results obtained in their utilization as:

- organic amendment;
- raw material for obtaining the fertilizers of organo-mineral type (solid, liquid or extraradicular);
- granulation agent for non-particulated fertilizers in category:
  - reactive phosphate rock;
  - partial activated phosphate rock;
  - potassium salts;
  - amorphous or milling calcium carbonate (chalk, phosphate chalk and magnesium chalk, etc.) phosphogypsum.

Posters

STUDIES TO OBTAIN SOME SOLID FERTILIZERS WITH MULTIPLE ACTIONS

G. Apostol[1], C. Simionescu[2], Georgeta Băleanu[2], A. Dorneanu[3], Cristina Costache[1], Oanamari Orbuleț[1], I. Constantinescu[1]

[1] „POLITEHNICA" University of Bucharest
[2] ICECHIM Bucharest
[3] ICPA Bucharest

This paper presents laboratory studies and manufacture flow-charts proposals, in order to obtain simple and complex solid fertilizers, with growth promoters, microelements and pesticides as supplements. Agrochemical tests, on various crops, have been also performed, being presented too. Laboratory studies allowed the authors to draw-up simple and cost accessible flow-charts. Agrochemical tests shown a high efficiency, measured as crop increases. When pesticides have been used as supplements, a high efficiency of pest control has been also observed.

RESEARCHES CONCERNING THE EFFECT SOME NEW FOLIAR FERTILIZERS REGARDING PRODUCTIVITY AND CULTURE'S QUALITY IN ENVIRONMENTAL CONDITIONS

Geanina Bireescu[1)], A. Dorneanu[2)], L. Bireescu[1)], Emilia Dorneanu[2)], Iuliana Breabăn[1)], I. Gavriluță[2)], Daniela Dana[2)]

[1)] ICB Iasi
[2)] ICPA Bucharest

In this paper we presents our researches results regarding some new foliar fertilizers, Romanian and import, on the cambic chernozem from Didactical and Experimental Station of Iasi, in the viticol ecosystem, *Chasselas doré* variety.

We analyzed the productivity and energetic efficiency of foliar fertilizers (3 sprinklers in 1000 litters solution/ha: after bloom, at 2 weeks and age seeds) and their influence regarding some productivity and quality indicators and photosynthesis, too.

We obtained very significant increase crops (28-36 %).

The energetic result indicators are increased.

The total content of chlorophyll and some productivity and quality indicators are positive influenced.

EFFICIENCY OF FERTILIZATION OF MELON AND WATER MELON CROPS ON SANDY SOILS

Elena Ciuciuc, A. Dorneanu

Dăbuleni Research-Development Station for Plant Growing on Sands

Research carried out at the Dăbuleni Research-Development Station for Plant Growing on Sands demonstrated that foliar fertilization of melon and water melon crops determines an efficient use of nutrients in the applied foliar fertilizers as well as their uptake under the conditions of applying N 100, P_2O_5 100, K_2O 100 kg/ha in soil.

The P in the foliar fertilizers stimulates the fruiting, increases the precocity and positively influences the quality of fruits.

The application of foliar fertilizers to the melon and water melon crops determined the NPK supply level of plants that led to significant yield increases as compared to the chemical mineral fertilizers applied in soil.

Yield increases between 2.2 - 4.9 t/ha due to Folifag, LSF 6236 and LSF 6238 fertilizers types applied to water melon, and due to LSF 6238, IFCS 6232 and LSF 6238 applied to melon were observed.

EVOLUTION OF MOBILE PHOSPHATES CONTENT UNDER THE CONDITIONS OF TWO SOILS AFFECTED BY SALINIZATION PROCESSES IN THE BRĂILA PLAIN

Remus Coşoveanu

Brăila Agricultural Research - Development Station

Soils affected by salinization processes have a chemical structure unsuitable to ensure a nutritional system necessary for a normal development of plants, so a good agriculture on such soils depends on the application of the chemical fertilizers, especially those with nitrogen and phosphorus.

Research had in view the influence of N and P on plants and winter wheat yield as well as the evolution of two elements in Mollic Gleyic Salt-Affected Alluvial soils - Valea Iencii (1981 - 1999).

Research results revealed the efficiency of N and P fertilization in obtaining both some important yield increases and mobile P content increase from 6.0 ppm P to 47.9 ppm P for 10 years in Mollic Gleyic Salt-Affected Alluvial soils and reaching up to 70-100 ppm P in Gleyic Salt-Affected Chernozems.

RESEARCH OF COMPLEX BALANCED FERTILIZATION EFFECT ON FRUIT YIELD AND QUALITY IN ORCHARDS GROWN ON SANDY SOILS

Mihaela Croitoru, Anica Durău, A. Diaconescu

Dăbuleni Research-Development Station for Plant Growing on Sands

Sandy soils have a deficient chemical structure and precarious balance affecting the normal development of plants. The development of a sustainable agriculture on such soils requires the fertilization as a real necessity.

The P fertilization, besides the other macro elements, is efficient in tree fruiting.

The research revealed that the fruit yields increased by a complex fertilization with the three macro elements.

The sweet cherry yield reached 9.4 t/ha (Van cultivar), being statistically ensured, when N 100, P_2O_5 150 and K_2O 150 kg/ha were applied.

With sour cherry (Nana cultivar), the best results (8.5 t/ha) were obtained by applying N 150, P_2O_5 150 and K_2O 150 kg/ha.

With peach, a yield of 22 t/ha was obtained by applying N 100, P_2O_5 80 and K_2O 100 kg/ha.

As concerns the P content in soil, the 3-4 years treatment led to a light increase: (1) by applying chemical and organic fertilizers, in the case of sweet cherry; (2) by applying a complex of NPK fertilizers, in the case of sour cherry; and (3) by a moderate fertilization (N100, $P_2O_5$80 and K_2O100 kg/ha), in the case of peach.

The quality of fruits was favourably influenced by the complex balanced fertilization leading to accumulation of dry matter, hydro-carbonates and vitamin C.

INFLUENCE OF PEAT AND SOME LIQUID FERTILIZERS ON ECOLOGICAL CROPS OF BELL PEPPER AND TOMATOES

Iulia Damian, A. Dorneanu, Emilia Dorneanu, Carmen Sîrbu

ICPA Bucharest

Among the vegetable species cultivated in Romania, tomatoes and bell pepper have an important place, with numerous uses both in fresh and canned state.

One of the main conditions is that the fruits of tomatoes and bell pepper should be free of no kind of pollutants or dangerous substances for human organism.

The obtaining of some fruits of tomatoes and bell pepper of high quality that can be considered ecological may be achieved by crops which mainly use organic natural products and reduced quantities of chemical fertilizers.

The peat represents the main product which can be successfully used for growing tomatoes and bell pepper. The basic property of this product is that it contains significant quantities of humic substance with important effects on soil amelioration and plant nutrition. The humic substances in peat are very resistant to decomposition, slowly releasing and in reduced quantities the nutrients. As result, it is prevent the phenomenon of accumulation in soil of some soluble substances, which being not assimilated by plants can create also in certain vegetation stages soil pollution effects. By fertilization with peat, the content of humic substances in soil can be improved at the level necessary for ensuring plant nutrition and dynamics nutrients in soil.

According to these principles, experiments were developed in glasshouse applying peat in a classically fertilized soil as compared to other fertilized only with mineral fertiliser.

The research results demonstrate that the peat fertilization ensures substantially higher yield increases and the chemical analyses on nitrogen content in yield attests the efficiency of peat in reducing the nitrate content in fruits.

The obtained results justify the research development for promoting the peat as organic fertilizer with ecological features for growing the vegetables as well as the utilization of liquid fertilizers.

USE OF LIQUID FERTILIZERS IN THE CONTEXT OF MODERN AGRICULTURE

A. Dorneanu [1], Emilia Dorneanu[1], Tr. M. Cioroianu [2], Carmen Sîrbu [1], A. Ilie [2]

[1]ICPA Bucharest
[2]S.C. CHIMRO S.R.L. Craiova

In the context of modern agriculture, the fertilization process at a more efficient level can be ensured with liquid complex fertilizers by method of applying the fertiliser in soil, as well as the fertilization by irrigation or drip irrigation, these methods representing modern technologies with quantitatively and qualitatively significant effects, no less economic due to the reduced nutrient consumptions, being easily controlled during the technological stages.

So, the conditions of a high efficient fertilization ensured by increasing the efficiently use of nutrients and pollution prevention corroborated with the previously applied basic fertilization and growing season phases, concomitantly with the use at reduced rates of classical chemical fertilizers.

The liquid complex fertilizers are recommended for field crops (small grains, sunflower, maize, potatoes, sugar beet, vegetables, etc.), grapevine, fruit trees as well as intensive vegetables in glasshouse and solaria).

EFFICIENCY OF SOME LIQUIDE FERTILIZERS WITH ECOLOGICAL FEATURES PROVIDED FOR FERTILIZATION OF CROPS IN GLASSHOUSES

Emilia Dorneanu [1)], A. Dorneanu [1)], M. Dumitru.[1)], Carmen Sîrbu [1)], Daniela Ştefănescu [1)], Daniela Dana [1)], Maria Schutz [2)], V. Dascălu [2)], Geosepina Popescu [2)]

[1)] ICPA Bucharest
[2)] S.C. Gini Transcom S.R.L., Craiova
[3)] S.C. SERE S.A. Codlea, Braşov

The paper presents the obtained results by applying liquid fertilizers with to tomatoes and cucumbers in glasshouse. These fertilizers contain macro- and microelements, are characterized by ecological features, and are essential for nutrition of plants. The treatment can be carried out both by foliar application or drip irrigation during the whole growing season. The obtained data show a high efficiency of these fertilizers proved by important yield increases and ecological quality of fruits.

The obtained positive results justify the testing of respective fertilizers with the main crops in glasshouse.

IMPLICATIONS OF P AND N FERTILIZATION ON SORGHUM GRAINS GROWN ON SANDY SOILS

Iulian Drăghici

Dăbuleni Research-Development Station for Plant Growing on Sands

Research carried out at the Dăbuleni Research-Development Station for Plant Growing on Sands emphasized the P fertilization efficiency with sorghum at rates of 50 - 100 kg P_2O_5/ha regarding the tolerance to drought and lodging as compared to the control.

As concerns the P influence on sorghum grain yield, the research revealed that P applied alone or associated with K, without application of N, does not lead to significant grain yield increases as compared to the control (non-fertilized). The highest level of grain yield was obtained by applying 50 -100 kg P_2O_5/ha (4996-5215 kg/ha) as compared to the control (4585 kg/ha).

At the same P rates, but associated with N, the highest sorghum grain yields were obtained by treatments with 120 kg N/ha (6365 – 6595 kg/ha) and 180 kg N/ha (7105 – 7323 kg/ha), respectively.

Research revealed also the important role played by P on protein content and its quality, contained amino acids, respectively, in sorghum grains, at a fertilization level of 50 -100 kg P_2O_5/ha.

EFFICIENCY OF P FERTILIZATION ON *VIRGINIA UNGUICULATA* SP. GROWN ON SANDY SOILS

Reta Drăghici

Dăbuleni Research-Development Station for Plant Growing on Sands

Results obtained with *Virginia unguiculata* sp. grown on sandy soils at Dăbuleni reveal the P role in plant fruiting process and grain weight increase as an effect of this element in extending the leaf surface area and plant photosynthetic capacity. The application of 40 kg/ha P_2O_5 produced, on an average, 11.7 pods per plant, 10.5 grains in a pod and mass of 1000 grains 182 g.

As compared to the control (non-fertilized), P applied in complex with N and K, at a rate of $N_{30}P_{40}K_{80}$, led to the best results (2675 kg/ha), reaching an energetic output of 4.69% and a profit rate of 99%.

EFFICIENCY OF BIOLOGICAL PROTONATION OF COLLOIDS FROM SOIL CULTIVATED WITH HORTICULTURAL CROPS IN PROTECTED SYSTEM ON pH AND SOLUBLE PHOSPHORUS CONTENT

I. Gavriluta [1], Daniela Ştefănescu [1], Gabi-Mirela Matei [1], Sorin Matei [1], Mihaela Dogaru [2]

[1] ICPA, Bucharest,
[2] Research–Development Station for Pomiculture, Baneasa

Recent research carried out world wide and in Romania (1993 – 2004) show that by biological oxidation of some residual or natural materials with sulphur, positive economical and ecological results were obtained.

This biological protonation of colloids from high base saturated soils (uncarbonated soils) aims a durable optimization of soil pH as well as the increasing of productive use degree by plants of phosphorus by their mobilization from insoluble forms.

The applied sulphur in soil is gradually oxidized by enzymatic control of sulphur oxidant bacterium from soil (*Thiobacillus*, especially), determines a soil reaction moving from neutral - easily alkali to easily acid domain (specifically for some plants), favourable in the same time for phosphorus mobilization from insoluble forms of the soil (especially from superior calcium phosphates).

Based on the same principles, this paper presents also some researches (remanent effect) regarding the influence of biologically protonation of the soil colloids cultivated with acidophil horticultural crops in protected system (greenhouse).

The new technology application (unpolluting technology) of biological protonation of high base saturated soil colloids (uncarbonated soils) may determines increasing of productive degree use (superior utilization) of phosphorus (including as remanent effect of sulphur application in the soil) from insoluble superior calcium phosphates of the soil.

Over this, the utilization of the biological protonation gives the possibility to use some residual materials, diminishing in this way the possible negative effect on environment.

MANAGEMENT OF NUTRIENTS TO OBTAIN SOME QUANTITATIVELY HIGHER SUNFLOWER CROPS GROWN AT THE SIMNIC AGRICULTURAL RESEARCH-DEVELOPMENT STATION

Emilian Viorel GIURESCU

The Simnic Agricultural Research-Development Station

The sunflower is the most important oil-crop in Romania. The fruits (achenes) of sunflower hybrids cultivated now contain between 43 and 58 per cent oil. At the same time, the sunflower is also a melliferous plant permitting to obtain 30-35 kg honey per hectare. The tests carried out at the Simnic Agricultural Research-Development Station rank the sunflower crop in the zone IV, a zone characterized by a moderate suitability for sunflower. The limiting factors are especially texture, soil erosion, insufficient phosphorus, potassium and humus supply, and temporal water deficit or excess, which means that the cultivated area represents only 4-5 per cent of the sunflower area.
The sunflower is a high consumer of nutrients. The production of 100 kg seeds + by products (300 kg stems and leaves) needs, on an average, a consumption of 3.65 kg N, 1.75 kg P_2O_5, 5 kg K_2O and 1.8 kg MgO. The consumption of nutrients varies, depending on the expected yields, that is 1.5-3 t/ha, between 54 and 109 kg/ha N, 26 and 52 kg P_2O_5, 75 and 150 kg K_2O. The nutrient consumption of sunflower is characterized by a slow absorption, maximum intensity being reached at the stages of inflorescence formation, flowering and seed formation.

The phosphorus is assimilated during the whole growing season, but with the higher intensity during the stages of calathis formation and fructification. Also the potassium is assimilated as the phosphorus during the whole growing season, but with a higher intensity at the occurrence of

inflorescence until the achene maturity. The maximum yield and the efficiency of some types of fertilizers were established according to the applied phosphorus and potassium rates computed taking into account the phosphorus and potassium content in soil.

RESEARCH REGARDING THE INFLUENCE OF LONG-TERM N AND P FERTILIZATION ON CAMBIC PHAEOZEMS IN FUNDULEA

Rodica Lazăr[1)], Nineta Rizea[1)], R. Lăcătuşu[1)], Beatrice Kovacsovics[1)], C. Lazăr[1)], Gh. Burlacu[2)]

[1)] ICPA – Bucharest
[2)] Research-Development Institute for Agriculture, Fundulea

The fertilization within the some sustainable vegetal production raises complex, agrochemical problems because the optimum agrochemical state surely determines the sustainable character of all the measures in agriculture (Borlan et al., 1996, 2000).

This paper presents the agrochemical analysis results of soil samples collected from the long-term experiment carried-out under the conditions of Cambic Phaeozems in Fundulea.

The long-term N fertilization on the Cambic Phaeozems in Fundulea led to the significant decrease of topsoil soil reaction in the treatments receiving 150 and 200 kg N/ha. Also, a very significant decrease of base saturation degree occurred in the N_{200} treatment in the case N fertilizer application, without P application.

The P fertilizers determined the increase of pH and base saturation degree, very significant increases in the P_{120} and P_{160} treatments.

The maize yields obtained on the Cambic Phaeozems in Fundulea show that N represents the main constitutive element for their growing, but P play a particular role whose efficiency considerably increases at the N presence.

The highest yield was obtained in N_{200}-P_{160} treatments, achieving a yield increase of 36%.

THE EFFECT OF SULFUR ADDITION ON SULPHUR BACTERIA IN DIFFERENT GROWTH SUBSTRATES FOR *GERBERA* CULTIVATED IN GLASS HOUSE

Gabi-Mirela Matei[1)], S. Matei[1)], I. Gavriluta[1)], Daniela Stefanescu[1)], Mihaela Dogaru[2)]

[1)] ICPA Bucharest
[2)] ICDP Baneasa

Research have been carried out in order to assess the effect of sulphur administrated in autumn 2003 on the development of sulphur bacteria in three growth substrates (black peat + manure, read peat + old manure and black peat + old manure) for the culture of various *Gerbera* cultivars in the glasshouse at Baneasa, during the year 2004 and the spring 2005.

The number of sulphur bacteria decreased more or less as a function of growth substrate composition and of *Gerbera* cultivar. The greatest number of sulphur bacteria was estimated in the variant with read peat + old manure (REBECCA cultivar) and at the cultivar TANIA from the variant with black peat + old manure. The sulphur bacteria from the cultivar CERISE in the substrate with black peat with manure have developed well, too. Severe decrease in sulphur bacteria number was recorded in the black peat +old manure at the cultivar SAHARA.

The paper presents aspects of microscopy concerning with the presence of the colourless, black and read sulphur bacteria on selective agar culture media.

INFLUENCE OF FOLIAR FERTILIZATION WITH PHOSPHORUS FERTILIZERS UPON GRAPE VINE GROWN ON SANDY SOILS

Iulian Răţoi

Dăbuleni Research-Development Station for Plant Growing on Sands

The supplementary fertilization represents a method to increase the yield and to improve its quality. In the case of grapevine, the complex foliar fertilizers contribute to increase both the grape yield per hectare and the quality of grapes and obtained wines.

The foliar treatments led to the grape yield increase with 1038-2488 kg/ha as compared to the treatment with only soil fertilization. The grape yield was mainly due to the increase of the average fruit weight.

The supplementary application of fertilizers rich in phosphorus led to wines richer in alcohol content with 0.3 - 0.5 vol. % higher as compared to the treatment without foliar fertilization.

THE ALBIC LUVOSOL OF ALBOTA, ARGEŞ COUNTY, UNDER THE LONG TERM NITROGEN AND PHOSPHORUS FERTILIZATION

Nineta Rizea[1)], Beatrice Kovacsovics[1)], Rodica Lazăr[1)], R. Lăcătuşu[1)], Mihaela Lungu[1)], Navara Dumitraşcu[2)], Daniela Ştefănescu[1)]

[1)] ICPA Bucharest
[2)] SCDA Albota, Argeş

Nitrate fertilizers application (N_{100}, N_{150}, N_{200}) on the Albic Luvosol at Albota determined a significant decrease of the soil reaction and a very significant one for the base saturation degree, while phosphorus fertilizers application didn't determine significant modifications of these characteristics.

The mobile phosphorus content increased significantly with the applied phosphorus dose (P_{80}, P_{120} and P_{160}). Through nitrate fertilizers association to the phosphorus ones, for the same phosphorus dose, smaller values of mobile phosphorus were recorded, as compared to the variant of application of phosphorus fertilizers only.

The maize yield obtained on the Albic Luvosol (WRB-SR, 1988) significantly increased with the applied nitrogen and phosphorus doses. The highest outputs were obtained by associating nitrogen and phosphorus fertilizers. Nitrogen fertilizers had the highest quantitative influence on the yield.

MOBILITY AND MOBILIZATION OF NUTRIENTS IN THE SOILS AS INFLUENCED BY MOISTURE CONTENT AND TEMPERATURE

Daniela Ştefănescu, Nineta Rizea, I. Gavriluţă

ICPA Bucharest

The paper deals with some methodological possibilities of disclosing and quantifying the nutrient mobility and mobilization in the soil as influenced by physical conditions (like moisture and temperature). This task has been approached by means of repeated percolate extractions from the same soil sample with diluted saline solutions and electro ultra filtration (EUF) at different temperatures and solution: soil ratios. With such techniques, the authors have determined several parameters of nutrient mobility in the soil among which, intensity (I), capacity (Q), kinetics (k) and initial velocity of nutrient desorption (Q.k) in the soil solution.

By using known and recognized physical-chemical relationships as for instance Stokes-Einstein equation and diffusion coefficients of ions in water, may be computed diffusion

coefficients of nutrient ions in soil and diffusive fluxes of nutrients in soil which where found to follow closely the absorption of nutrient ions in plants. Variation redox potential due to soil and of temperature interplay has also significant consequences, both positive and negative, on the mobility of nutrient ions into the soil.

FERTILIZATION RESEARCH OF GRAFTED WATERMELON CROPS GROWN ON SANDY SOIL

V. Toma, Mihaela Croitoru, Marieta Ploae, Elena Ciuciuc

Dăbuleni Research-Development Station for Plant Growing on Sands

In order to establish the efficiency of the organic and mineral fertilizers with crops of grafted watermelon on sandy soils, at the SCDCPN Dăbuleni, research on yield level and quality as well as on their output was carried out. The applied rates were according to the fertilization technology recommended for non-grafted crop (N 150, P_2O_5 100, K_2O 100), and reduced rates of organic and mineral fertilizers were applied, too.

The grafting determined a higher efficiency of fertilizers, the experiment results demonstrating that the decrease with 50 per cent of technological fertilization rate for the non-grafted crop does not determine the decrease of yield level and increases the output of using the organic and mineral fertilizers. The *Criby* F1 watermelon hybrid grafted on *Lagenaria siceraria* (*Macis* F hybrid) produced 80 t/ha by applying a mineral fertilization at a rate of N 75, P_2O_5 50, K_2O 50, with a crop density of 7930 plants/ha.

FACTORS THAT NEGATIVELY INFLUENCE PHOSPHORUS PLANT NUTRITION AND SOIL PRODUCTIVITY PROTECTION MEASURES ON VINGA HIGH PLAIN

D. Ţărău *, I. Borza*, Irina Ţărău**

*USAMVB Timişoara, ** OSPA Timişoara

The paper shows main aspects referring on soil resources of Vinga High Plain [having 132.592 ha of which, agricultural, 116.784 ha (87.86%)].

Agrochemical mapping synoptic shows a high area percentage of mobile phosphorus deficits.

Add to this, often we note symptoms of phosphorus deficit at sensitive young plants, even on phosphorus rich soil.

Finally, we present the measures to be applied for soil productivity limitative factors correction.

SOIL FERTILITY EVOLUTION IN INTENSIVE AGRICULTURAL EXPLOITATION SYSTEM IN ARAD COUNTY

H. Vlad *, I. Borza **, D. Ţărău **, D. Dologa *, M. Florea *

*OSPA Arad, **USAMVB Timişoara

Incomplete or incorrect cultural systems applied on agricultural terrains, badly affect both in quality and quantity not only yield, but also soil resources (especially).

Agrochemical mapping synoptic based on OSPA Arad data, regarding phosphorus and potassium soil levels show the increasing trend for enlarging areas with very poor, poor, and medium supply of these two elements.

Although specific evolution of pedologic landscape of Arad County imprinted a certain direction of areas distribution of phosphates issued from parental materials, this distribution was altered due to badly conceived agricultural systems implementation.