



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

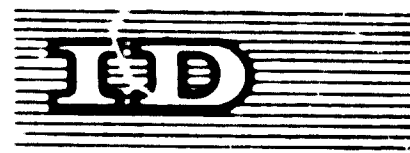
Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.



D02968



Distributions  
LIMITED

ID/WG.99/92  
26 November 1971

United Nations Industrial Development Organization

Original: ENGLISH

Second Interregional Fertilizer Symposium

Kiev, USSR, 21 September - 1 October 1971  
New Delhi, India, 2 - 13 October 1971

Agenda item VIII/14

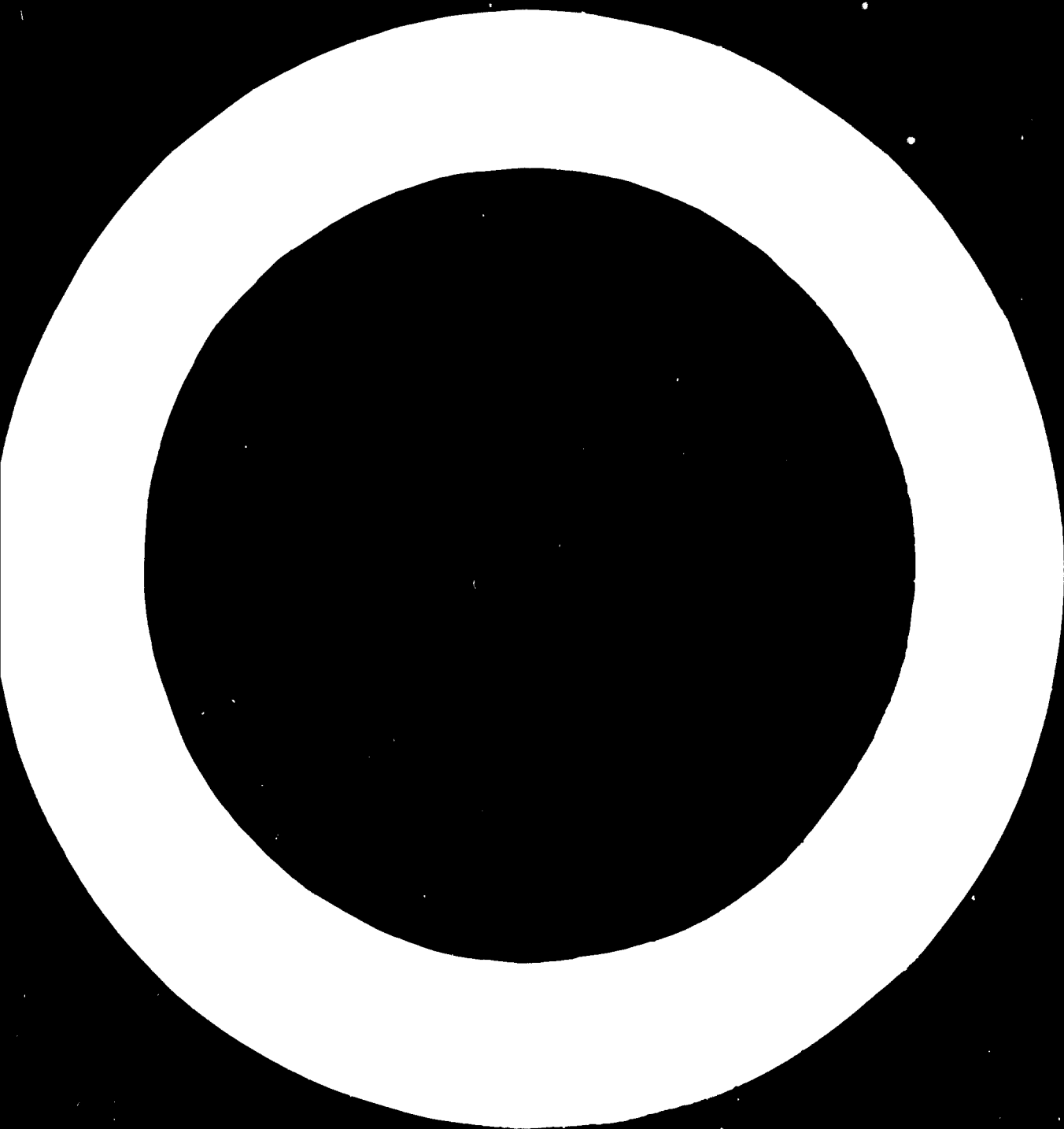
TRENDS OF CO-OPERATION AMONG THE CMEA COUNTRIES  
IN THE USE OF MINERAL FERTILIZERS<sup>1/</sup>

by

E. Schmidt

Council for Mutual Economic Assistance  
Moscow USSR

<sup>1/</sup> The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.



In the process of intensification of agricultural production primary importance is attached by the CMEA countries to raising the productivity of land as a main means of production in agriculture. They consider that systematic raising of the soil's fertility ensures bumper and steady crops with the minimum labour expenditure and costs per unit of production.

The level and rate of intensification in the agricultural production practiced by the CMEA countries has been largely determined by the progress made in the chemization of agricultural production, in particular, by use of chemical fertilizers. That is why the CMEA Standing Commission on Agriculture, from the very start of its activities, paid special attention to working out recommendations on more extensive use of mineral fertilizers. For this purpose the CMEA Standing Commission on Agriculture organized systematic exchange of experience, and worked out proposals on the practical use of latest scientific achievements in the following fields: expansion of the range of mineral fertilizers used, optimum proportion of nutrient substances when used for various agricultural crops, technology of their use and influence of soil and climatic conditions on the efficiency of mineral fertilizer used.

During the 20 years of the CMEA activities its member-countries have raised substantially the volume of

mineral fertilizers used. At present, they are using, over 19,8% of arable land and perennial plantations of the world, about 30% of all the mineral fertilizers used in the world, including nitric - 28%, phosphorus - 29%, and potash - 32%. The average annual rate of increase in the consumption of mineral fertilizers in the CMEA countries made up about 20% in 1951-1960, up to 30% in 1961-1969, whereas with relation to the world total this index was equal to 17 and 23 per cent respectively.

A wide use of mineral fertilizers matched by the introduction of new varieties and better agrotechnics and other improvements, has told substantially on the yield of agricultural crops in the CMEA countries. For example, an average yield of wheat in all the CMEA countries during the four years of 1966-1969 was 25% higher than that in the period of 1961-1965, and compared with the average index of 1951-1955 - 35% higher.

In separate CMEA countries an average wheat crop during the 4 years of 1966-1969 increased against the average crop of 1961-1965 at about the following rate: in Bulgaria - by 48%, in Hungary - by 34%, in the GDR - by 16%, in Poland - by 18%, in Rumania -- by 19%, in the USSR - by 33% and in Czechoslovakia - by 19%.

The CMEA countries produced during the period of 1966-1969 34.2% of the total wheat production in the world as compared with 31.2% in 1961-1965.

A rapid growth in the consumption of mineral fertilizers in the CMEA countries has been particularly the result of coordination of efforts made by the countries within the CMEA framework in the solution of major problems which determine the conditions and possibilities for the development of the raw material basis and fertilizers industry, as well as in the field of highly effective use of fertilizers.

The CMEA Standing Commission on Agriculture has always proceeded from the fact, that the use of mineral fertilizers can substantially influence the fertility of soil and boost the yield of agricultural crops, and considers that at present more than half of the crop's surplus is attributed to the effect of mineral fertilizers.

During the years of its activity the CMEA Standing Commission on Agriculture has many a time organized discussions of the experience gained in the effective use of fertilizers and worked out relevant recommendations to the CMEA countries. Questions for discussions arose in the process of development in the use of mineral fertilizers in the CMEA countries, when their solution was of common interest. Below is the survey of the results of these discussions and of experience of the CMEA countries which they gained in the use of mineral fertilizers

The CMEA Standing Commission on Agriculture has always attached, in the field of effective use of mineral fertilizers, great importance to all-round consideration

and most full use of soil and climate factors. For this purpose research studies were conducted of the effect produced by mineral fertilizers in various soil/climatic and economic conditions at different levels of their use. The results of these studies have been used for more rational per area distribution of fertilizers and definition of their optimum doze. In order to make a more thorough study of the effect produced by fertilizers research was also carried out of the balance of nutrient substances in the soil and of the influence of fertilizers on the quality of the crop.

Substantial role in the correct use of mineral and organic fertilizers, especially under conditions of specific farms, is played, in the opinion of the CMEA countries by agrochemical service. That is why the CMEA Standing Commission on Agriculture has repeatedly dealt with the agrochemical service in the CMEA countries, of which we shall speak later.

In order to insure the effective use of mineral fertilizers the Standing Commission on Agriculture made the following recommendations to the CMEA countries:

- mineral fertilizers are to be used in close combination with the complex of agro-technical measures, such as the use of organic substances, timely cultivation of soil, the use of scientifically founded crop rotation, ect.;



- mineral fertilizers are to be used in accordance with the systematic field experiments and systematic agrochemical study of soils;
- when using mineral fertilizers, it is necessary to study their effect upon the quality of agricultural crop;
- it is to be taken into account, that the effective use of mineral fertilizers necessitates the liming of acid soils;
- mineral fertilizers are to be primarily forwarded to areas with sufficient atmospheric condensation and irrigated land, and it is deemed necessary to accumulate and preserve moisture.

The COMECON Standing Commission on Agriculture drew attention in its recommendations to the fact that the economic effect produced by mineral fertilizers depends largely on the time and norms of their use.

During the period when there was a shortage of mineral fertilizers in the COMECON countries, a wide spread practice was to apply them locally, in small quantities, into rows, nests and holes while sowing or planting agricultural crops, especially when using nitric fertilizers and granulated superphosphate.

As the supply of mineral fertilizers to farms grew a possibility emerged in all the COMECON countries to turn from fertilization of separate crops to the system of fertilization in crop rotations. Under such system, as practice

showed, the effect produced by mineral fertilizers is substantially increased, which tells on the yield of all crops in a rotation and contributes to gradual increase in soil fertility. In doing so it is useful to apply mineral fertilizers primarily for leading crops in a rotation, yielding the biggest crop surplus per unit of fertilizer applied.

Questions relative to the system fertilization for different crop rotations in specific soil/climatic conditions and continuation of studies in this direction constitutes one of the major tasks of research work on which the Standing Commission on Agriculture adopted recommendations to the CMEA countries.

In order to decrease labour expenditure in the use of fertilizers, the CMEA countries have been studying and practicing in certain areas the use of phosphorus and potash fertilizers in stock. Due to low consumption of phosphorus fertilizers in the first year and incomplete use of potash fertilizer, as well as insignificant washing away of phosphorus and potash (except on very light soils), it was found to be justified by many production experiments that it pays to apply big doses of phosphorus and potash fertilizers in stock for 2 or 3 years with no decrease in efficiency.

In connection with substantial increase in supplies of mineral fertilizers to agriculture in the CMEA

countries, the CMEA Standing Commission on Agriculture is busy at the moment preparing recommendations on the organizational and technological aspects of their use.

Due to the fact that the way mineral fertilizers are used is primarily influenced by the range and quality of the fertilizer supplied, the CMEA Standing Commission on Agriculture had to formulate the requirements that the range of mineral fertilizers should meet, of which will be said later.

As to the network of fertilizer depots established in the CMEA countries, the following trends can be traced in the way fertilizers are stored:

- storage at agricultural enterprises;
- storage at central depots; and
- storage both at central and individual farm depots.

The central depots are placed, as a rule, at the so called agrochemical centres, which play a significant role in the CMEA countries. These centres constitute specialised permanent organisations which act either as independent economic entities or are included into inter-farm structure, and are assigned to transport, storage or apply mineral fertilizers. (In countries with larger agricultural entities they can be part of economic entities, which act as specialised teams).

In addition to the tasks named, agrochemical centres also perform work in other fields of chemisation in

agriculture. These centres concentrate machinery for fertilizer application, including agricultural aircrafts.

Questions of fertilizer applying machinery were discussed by the CMEA Standing Commission on Agriculture when an international system of machinery was developed, which is the system of requirements that agricultural machines for particular application should meet.

Taking into account that there is a lot of sour and very sour soils in the CMEA countries, and that the use of calcium fertilizers on these soils can be very useful in raising general soil fertility, and, particularly, in raising the effect produced by mineral fertilizers, the CMEA Standing Commission on Agriculture studied the problems of organization, technology and economic aspects of soil liming.

Multiple agricultural research and field experiments in the CMEA countries, whose intensity particularly grew at the turn of the 60ies, show high efficiency of liming manifested in considerable increase in the crop yield on sour soils. The yield surplus due to liming has been registered in relation to practically all agricultural crops, particularly in relation to leguminous plants and mixed crops of leguminous plants and cereals.

The effect of the basic liming or the so called meliorative liming, i.e. when full doses are applied,

does not wither away for 10 years and more; whereas liming with smaller doses can insure a continuous effect during 5 years.

The results of economic studies, carried out in all the CMEA countries, show that liming of soil constitutes a highly paying agromeliorative method. The economic effect produced by it is 3 to 6 times higher than the original cost of liming. Thus, liming costs can pay off during first two years following it.

On the basis of recommendations made by the CMEA Standing Commission on Agriculture, various economic measures are taken in the CMEA countries which contribute to wider liming of sour soils. In separate countries substantial funds are made available every year for this meliorative measure. In the CMEA countries where liming is performed on a large scale, specialized organizations have been established for this purpose, or else this task is performed by already mentioned agrochemical centres. The technical side of applying liming materials in the CMEA countries has been largely solved through pneumatic distribution over the fields.

At the turn of the 60-ies the CMEA countries started the application of liquid fertilizers. Most widely used were liquid nitric fertilizers in the form of anhydrous ammonia, caustic ammonia and ammoniacal. In some countries anhydrous ammonia is more widely used, whereas in other it is caustic ammonia.

In 1965 the CMEA Standing Commission on Agriculture summed up the experience in the use of liquid fertilizers and recommended to the CMEA countries to expand the use of nitric and composite fertilizer solutions. These types of fertilizers are perspective for agriculture, because their basic properties (high concentration, content of several nutrient elements and liquid form) meet the requirements that agricultural production expects of mineral fertilizers.

Research results of the tests performed with liquid nitric fertilizers and the experience gained in the CMEA countries testifies to the fact that all forms of the liquid nitric fertilizers are quite equal in their effect to non-liquid nitric fertilizers. The correct use of the ammonia form of fertilizers does not influence negatively upon germination and further development of agricultural crops. The one sided effect of ions of ammonia upon soil continues during the vegetative period for a short time as a result of their nitrification. Deep application of liquid nitric fertilizers contributes to more even supply of nitrogen to plants.

In drought-afflicted areas of the CMEA countries the use of liquid fertilizers proved to be more effective than that of non-liquid nitric fertilizers. At present anhydrous and caustic ammonia is used in the CMEA countries to fertilize all agricultural crops, although this application

of fertilizers in the CMEA countries has not yet been practiced so widely as in some other countries.

However, the practical experience of the CMEA countries in the use of anhydrous and liquid ammonia show that liquid nitric fertilizers can constitute greater part of the nitric fertilizers used in those areas where soil/climatic and economic conditions justify their application. Taking into account the larger scale in the use of liquid fertilizers, the CMEA Standing Commission on Agriculture has worked out appropriate recommendations to the CMEA member-countries.

The large scale use of liquid fertilizers for whole areas coupled with the use of modern technical means makes it easier to insure the continuity of supply, rational use of the means of transport, storage and application, which leads to high economic effect. The CMEA Standing Commission on Agriculture paid attention to the fact that it is the prior solution of these questions that contributes to wider use of liquid fertilizers. In order to widen the rational use of liquid fertilizers it is necessary to define in each country those areas, where soil/climatic and economic conditions are most favourable for their large scale use. The CMEA countries plan for further development in the production and use of liquid nitric fertilizers in the coming years, and will create necessary technical prerequisites for such development.

In recent years the CMEA countries conducted large scale work on the study of economic efficiency offered by the use of liquid nitric fertilizers as compared with non-liquid nitric fertilizers. The results of economic analyses shows that the economy of investment offered by the construction of plants to manufacture liquid nitric fertilizers cover a higher investment on their use in agriculture.

The production cost of a unit of nutrient substance contained in different forms of nitric fertilizers is 20 to 30% lower than that of non-liquid forms.

The use of caustic ammonia has importance in some CMEA countries over areas which are close to manufacturing plants, where transportation, storage and application costs of the liquid form are lower, than those of processing into non-liquid nitric fertilizers and their further application.

The basis of expansion and higher profit is in the radical change of the entire method of transportation, storage and application, and, particularly, in the existence of necessary technical means and machinery. The practice of the use of liquid nitric fertilizers showed that the greatest effect produced by them is achieved when their application is coupled with various forms of soil cultivation. In connection with the growing range of mineral fertilizers and use of liquid nitric fertilizers a question was raised relative to study of the use of urea. Relevant experiments in the use of urea were conducted in the CMEA countries.



The CMEA Standing Commission on Agriculture discussed the results of those experiments and worked out a number of recommendations.

The purpose of the above research also to study agronomic effect of urea compared to other nitric fertilizers (ammonium and lime-ammonium nitrate), define the conditions of its most effective use for agricultural crops in different soil/climatic zones. Vegetative, field and production experiments were conducted. Their results showed that urea is basically equal in its effect to other nitric fertilizers for most of agricultural crops. In conditions of non-irrigation it is recommended that urea be put into the soil 3-4 cm deep from the surface. The urea is also used as a basic nitric fertilizer for off root fertilization. The CMEA Standing Commission on Agriculture recommended urea also for production of mixed and liquid fertilizers and for use from the aircraft.

In order to intensify further agricultural production the CMEA countries plan a considerable expansion of irrigated land in their perspective. Besides the right choice of agricultural varieties, modern agrotechnology, the intensive use of mineral fertilizers on irrigated areas is of great importance.

Within the framework of international coordination of scientific research in the field of agriculture, conducted by the CMEA Standing Commission on Agriculture, the

theme "Use of fertilizers in irrigated agriculture" is being developed.

When summing up the results, the CMEA Standing Commission on Agriculture paid attention to the fact that the combined effect produced by mineral fertilizers and irrigation is greater than the sum of each method taken separately. In conditions of irrigation for most agricultural crops on all soils the prime effect is produced by nitrogen, although even a small lack of phosphorus and potash in the nutrition of plants lowers the crop and the quality of products. For irrigated cereals the importance of phosphorus is no smaller than that of nitrogen in the nutrition of plants.

In order to achieve maximum effect in the use of mineral fertilizers it is necessary to maintain an optimum level of irrigation during the vegetation. The method of irrigation substantially influences the effect produced by fertilizers: when irrigation is overhead it is deemed possible to use effectively higher doses than with other methods of irrigation. When provision of plants with nutrients substances is optimum, water consumption per unit of production are lower, i.e. water is used more effectively.

Any deviation from the optimum in the nutrition of plants leads, as a rule, to lower qualities of the irrigated agricultural crops. Therefore, provided there is an optimum irrigation level and crop varieties are chosen right.

it is useful to increase the mineral fertilizer dosage.

The CMEA Standing Commission on Agriculture, using the data supplied by the CMEA countries, defined the long term needs of agriculture in mineral fertilizers, both in quality and the range.

The CMEA Standing Commission on Agriculture deems it necessary to pay attention to farther cooperation of the CMEA countries in the maintenance of a high rate of mineral fertilizer consumption, and wider use of highly concentrated and composite fertilizers.

Thus, for example, the share of urea in the consumption of nitric fertilizers in the CMEA countries made up only 1.5% in 1960, whereas it reached 11% in 1965, and in the near future the target is 17 to 18%. The share of the combined nitric fertilizers will reach 50% by 1975, whereas the sum total of concentrated and combined nitric fertilizers will be brought to 90-93%. The share of combined phosphorus fertilizers will increase to 80%. At the same time some CMEA member-countries have completely abandoned the use of simple superphosphate in favour of concentrated superphosphate (double or triple one). The share of combined (potash-containing fertilizers) shall make up around 70%.

In order to determine the needs of agriculture in mineral fertilizers, the CMEA Standing Commission on Agriculture considered methods to determine the balance of basic nutrient substances in soils, and use of this data

for the purpose of rational application of mineral fertilizers with regard to soil/climatic conditions. The Commission came to a conclusion that determination of the balance of basic nutrient elements in the soil together with other methods enables to determine the needs of agriculture in mineral fertilizers at a known level of crop yield.

At the same time the CMEA Standing Commission on Agriculture recommended that while defining needs in mineral fertilizers, the results of international research in the field of agriculture should be used. This research is coordinated by the CMEA Standing Commission on Agriculture, and its subject is entitled: "Norms and proportions of fertilizers and conditions of their use with regard to soil characteristics and prospects of fertilizer use in the CMEA countries". The basis for the above research was offered by a wide geographical network of field experiments on the use of mineral fertilizer in all the CMEA countries, with different dosages used and their economic effect defined.

The CMEA Standing Commission on Agriculture recommended to the CMEA countries that while studying the balance of nutrient substances in the soil special attention should be paid to accounting of the debit side of the balance, such as the loss of nutrient substances due to evaporation, washing away by water, water and wind erosion, irreversible and temporary fixation of nutrient

substances, loss in the course of the fertilizer use itself. These processes are studied in the countries by different methods, for example, in lysimetric research. The study of this unproductive losses of the debit side of the balance enables to work out ways to decrease those losses of nutrient substances to the minimum. In this connection the Commission recommended to the CMEA countries the following basic venues:

- improvement of the range of mineral fertilizers with regard to soil/climatic conditions, and improvement of physical and chemical properties of fertilizers, definition of optimum dosage, times and methods of fertilizer use, conduct of chemical melioration, etc.;
- improvement of agrotechniques (choice of varieties and hybrids of agricultural crops responsive to fertilizers, specification of areas to be fertilized with regard to fertilizer dosage, irrigation and drainage, improvement in the specialization of farms and crop rotation in connection with growing fertilizer dosage, use of growth controls, agricultural pest and diseases control, and control of weeds, etc);
- reduction of loss of the nutrient substances due to washing away, water and wind erosion.

- improvement of technology for use of fertilizers, reduction of losses in transportation, handling, storage, preparation and use;

Although when making a balance of nutrient substances in agriculture one is faced with a number of difficulties, and even conventions, the method of the balance of nutrient substances presents a certain interest in determination of fertilizer needs in agriculture.

To the credit side of the balance the following sources of nutrient substances in the soil are attributed:

- entry from mineral and organic fertilizers;
- entry from atmospheric precipitation;
- entry resulting from weathering and mineralization in the soil;
- entry of nitrogen by way of biological fixation;
- entry together with seed and planting materials.

When considering the credit side of the balance the properties of soil are taken into account. In all the CMEA countries there is a regular review, with more or less entire territorial coverage, of nutrient substances assimilated from soil. Various forms and organizations of agrochemical service have been established for this purpose.

Since the nitrogen content in all soils of the CMEA countries is low and the use of nitric fertilizers is therefore has high efficiency, optimum dosage for use of nitric fertilizers is determined, as a rule, in the

CMEA countries not on the basis of the nitrogen balance in the soil, but on the basis of field experiments with nitric fertilizers which are conducted to define their economic efficiency. In the CMEA countries there have been developed or are being developed production functions of relations between the dosage of the use of nitric fertilizers and the yield of agricultural crops depending on soil and climate conditions. The development of production functions for basic types of agricultural crops and conditions in the countries can serve as a basis for specific plan on the use of nitric fertilizers.

The necessary initial data for these calculations are furnished in the CMEA countries by the agro-chemical service, particularly, by its geographical network of outlets for conducting field experiments.

At present the CMEA Standing Commission on Agriculture has started a review of progressive experience of the CMEA countries gained on econo-mathematical models incorporating the use of computers intended to define natural and economic conditions for dosage of nitric fertilizers. These calculations constitute an important condition for developing recommendations on the use of fertilizers on farms. The production functions developed in the countries with regard to gains and costs in fertilizer use by the method of non-linear optimisation constitutes the basis for regional distribution of mineral fertilizers, because

for each dosage of nitric fertilizers an expected increase in the crop yield or gains on all types of agricultural crops in all conditions of production can be calculated.

In order to establish dosages for phosphorus, potash and magnesium fertilizers in the CMEA countries the above method of nutrient substances balance is used, since basically one has to compensate these elements assimilated by crops or lost (with regard to entry of nutrient substances into soil by other ways beside those entered with fertilizers).

In order to determine the dosage for these fertilizers, there is also a possibility to develop an economo-mathematical model based on the plant requirements in nutrient substances and the study of soil characteristics

Because of the importance of these tasks, which became ripe within the framework of intra-CMEA cooperation and which are being solved by joint effort the CMEA Standing Commission on Agriculture attaches great importance to agrochemical service in the CMEA countries and improvement of its activities.

The agrochemical service was established in the CMEA countries mainly in the 50-ies to put into practice of agricultural chemization scientific achievements, and provide governing bodies of the countries with necessary data on the fertilizer needs of the country's soils to be used as a basis for planning of fertilizer production, import or export, etc.



In all the CMEA countries the activities of the agro-chemical service, particularly, systematic agro-chemical study of soils, became an integral part of agriculture and promoted rapid growth of chemization of the agricultural production.

As a rule, the agro-chemical service of the CMEA countries incorporates a network of agrochemical stations, which are under operative management of specialized departments attached to ministries of agriculture and placed under scientific and methodical supervision of research institutes.

The basic task of the agro-chemical service is to study systematically all the agricultural lands of the country with the purpose of defining basic nutrient substances content, the acidity of soil and other agro-chemical parameters, and of late also the microelements content. These studies are conducted in the CMEA countries depending on the intensification of production an average five years. On the basis of soil studies agro-chemical charts and diagrams are worked out for agricultural practice, using which local agro-chemists define fertilizer requirements and the need for use of fertilizers in relation to this or that crop on certain fields. Recently the CMEA countries started to develop recommendations on the use of fertilizers on separate fields on the basis of econo-mathematical models incorporating computers installed at agrochemical stations.

In many of the CMEA countries the agrochemical service has centralized network of outlets for conducting field experiments with fertilizers. In some CMEA countries beside tasks in the use of mineral fertilizers, the agrochemical service performs some other functions, such as fertilizer and liming material control, fodder quality control, etc.

A new theme is being developed within the framework of the CMEA Standing Commission on Agriculture, which is entitled: "Testing of mineral fertilizers, particularly, of new combined and concentrated forms, including, the definition of economic efficiency of their use". The experiments were conducted in the geographical network of outlets for field experiments, established by the agrochemical service of the CMEA countries.

A study was conducted of the influence of the type of soil on the process of disintegration of urea, and of the effect of various slowly acting nitric fertilizers of the type of urea condensates with aldehydes on the yield of agricultural crop. It was established that NPK-fertilizers with the urea condensate content when used for winter wheat, especially for varieties which require more nitrogen in the second part of vegetative period, yield better results. Various testing of combined fertilizers of the PK, NP and NPK type were carried out. It was established that out of the various

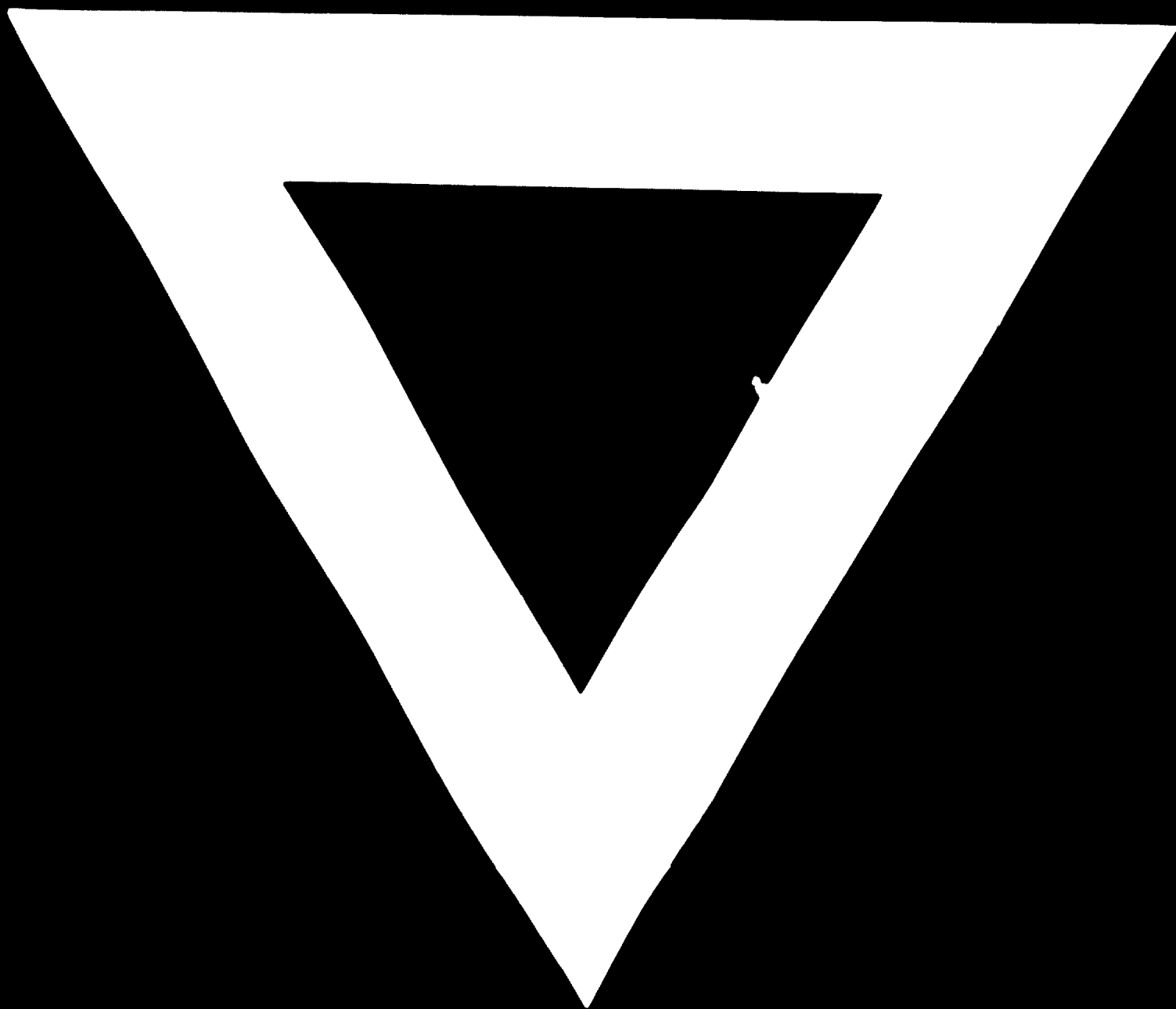
forms of phosphorus fertilizers, a particularly active effect was registered with respect to ammonium polyphosphate and calcium polymetaphosphate.

Big work is being conducted now on the development of measures to realize combined, phased perspective, programme of further extension and improvement of intra-CMEA cooperation and development of the socialist economic integration. A considerable part of this programme provides for chemisation of agriculture, including the production and consumption of mineral fertilizers, which is regarded as a basic factor of further intensification of agricultural production.

The CMEA Standing Commission on Agriculture has been developing measures on the expansion and deepening of

intra-CMEA cooperation in the field of scientific and technological research, while paying particular attention to various aspects in the use of new types of mineral fertilizers, especially of combined and concentrated type.





**8 . 8 . 7 3**