Use of Agricultural Minerals in Western Georgia for Agriculture

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In recent years, the decline in soil fertility in Georgia has taken on an intensive character. Soil degradation and nutrient depletion are occurring. The humus deficit is particularly significant. Its reduction is observed in almost all soil types. This process is particularly intensive in the soils of Western Georgia. It should be noted that the process of humus decomposition in nature proceeds more rapidly, while even a 0.5% increase would take a century. This clearly shows the danger facing Georgia's soil cover fertility and how much serious attention it requires. Almost 70-80% of the total area is experiencing obvious starvation for both micro- and macroelements. This negative process is more intensively occurring in Western Georgia, particularly in the Colchis Lowland, which is determined by climatic conditions and the peculiarities of soil types. One of the major reserves for improving the physical-chemical properties and structure of soils is the use of local agricultural raw materials, whose extraction, processing, and implementation in agricultural service is much more realistic and economical than importing mineral fertilizers and various chemical products from outside the country.

Keywords: nutrients, mineral fertilizers, agricultural minerals

Western Georgia is quite rich in agricultural minerals. Their use will be a great guarantee for increasing the fertility of acidic, yellow earth, podzolic, carbonate-clay, waterlogged, and other soils widespread in this region.

Local fertilizers (there is real prospect for them) are of greatest importance precisely today for our country, including Imereti, when for various reasons the supply of agriculture with mineral fertilizers has decreased so significantly. Moreover, it should be emphasized that organic fertilizers will not lose their importance even when the time comes and the supply of our diversified agriculture with mineral fertilizers increases. On the contrary, along with the increase in the use of mineral fertilizers, the importance of organic fertilizers as one of the main links in nutrient cycling increases even more.

It is known that peat with a decomposition degree of less than 20-25% is not suitable for preparing ordinary compost, but this does not mean at all that its use in agriculture is completely impossible. Precisely such types of peat should be used as bedding in animal housing.

The use of peat as bedding, in addition to obtaining high-quality organic fertilizer (7-10 tons per animal over 200 days), significantly improves the hygienic conditions of livestock housing - ammonia nitrogen,

carbon dioxide, and other substances in the air are reduced, which has certain significance from the perspective of environmental pollution protection. Particularly noteworthy is the fact that the acidity of peat used as bedding limits the development of disease-causing microorganisms (paratyphoid, brucellosis, tuberculosis); the spread of parasites - bed bugs, ticks, and others is also hindered.

It is known that the use of pure peat as fertilizer does not give the desired effect. Therefore, it must be properly enriched with various reagents, compost must be prepared, and only then will high-quality organic fertilizer be obtained from it.

Professor A. Menagarashvili has established that the use of various types of peat fertilizers increases the yield of tea and citrus by 25-30%, grain crops by 28-30%, and vegetables by 30-32%. Particularly noteworthy is the fact that peat, with its enormous absorption capacity, promotes the retention of mineral compounds and reduces their leaching, which prevents groundwater pollution.

At the same time, the issue of peat drying and grinding must also be resolved. No reagent or peat prepared by any recipe will give effect if the moisture content of the original peat intended for fertilizer is not reduced to 60-65%, and the grinding degree of peat (grain diameter) to 1 cm.

A real source for filling the deficit of organic fertilizers - peat reserves are quite abundant in Western Georgia - in the territories of Imnati and Grigoreti in Lanchkhuti district, as well as in the vicinity of Pichori, where extraction work (extraction, processing) is carried out according to a pre-developed program, but unfortunately, in recent years, peat extraction work at these deposits has practically ceased. It is essential that peat enterprises be restored and peat extraction and processing work begin again. We must remember that by resolving this matter, using all the latest technologies and regulations, we must also ensure the maintenance of ecological balance in the mentioned region.

The soils of humid subtropics widespread in Western Georgia are characterized by high acidity. Their pH reaction ranges from 3.0 to 5.5. These soils are characterized by negative physical-chemical properties, which limits the normal growth and development of plants. On these soils, the productivity of both annual crops and citrus and perennial plantations is very low. An essential and irreplaceable condition for increasing the fertility of these soils and increasing productivity is liming.

Soil liming improves the physical-chemical and biological properties of soil. It promotes increasing the efficiency of mineral and organic fertilizers. Under the influence of lime fertilizers, the utilization coefficient of mineral fertilizers increases by 10-15%, which, in addition to increasing productivity, has the significance that less residue of fertilizers applied to soil remains, and accordingly their leaching and groundwater pollution decreases. Numerous experiments conducted in Georgia show that under the influence of lime fertilizers, the productivity of various agricultural crops increases by 20-25%. Moreover, the quality of production also significantly improves.

Lime fertilizers include limestones, dolomites, lime tuffs, marlstone, production waste, and others. Limestones exist in large quantities in the form of deposits.

Limestones are found in large quantities in Western Georgia in the territories of Vani, Baghdati, Kharagauli, Sachkhere, and other administrative districts. In many cases, limestones are found in quite large quantities near the areas to be limed. For it to be used as fertilizer, grinding is necessary. The fineness of grinding according to the standard should be - at least 30% should pass through a
sieve with 0.17 mm diameter holes, and at least 95% through a 1.65 mm sieve. The duration of lime action varies depending on soil acidity and lime doses and often lasts 10 years or more.

In Western Georgia, back in the 1920s-1930s, peasants intensively used limestones, marlstones, and marls on their plots. Of course, they did not know what kind of measure this was or what processes were occurring in the soil, but they clearly saw how the productivity of agricultural crops increased with

the application of these substances. In subsequent years, the development of chemistry, the expansion of mineral fertilizer use, and soil processes somewhat increased the area of acidic soils in the region, and already in the 1960s, financing of liming work on these soils began. Liming was carried out annually on 10-12 thousand hectares and the cycle was repeated every 6-7 years, which significantly reduced the area of acidic soils. On limed areas in production conditions, corn yield increased by 10-15 centners, vegetables by 16-18 centners, silage corn by 140-150 centners, and citrus yield by 31-39%.



Slaked lime



Lime deposit



Limestone

In recent years, due to lack of financing, the volume of this work has significantly decreased, and in 1990 it amounted to only 3,000 hectares, in 1992 only 500 hectares, and in 1993-1996 it stopped completely. This means degradation of soils in this zone, increase in acidity, and sharp decline in fertility. Over time, it will cause soils to drop out of agricultural circulation, which is completely unacceptable for already land-scarce Georgia.

Thus, existing limestone deposits must be intensively used for liming acidic soils, which will significantly reduce costs and achieve high economic effect.

The soil fertility service must seriously undertake this matter, and the Ministry of Finance should provide for financing of the work from the state budget.

Bentonite clays are quite abundant in Western Georgia and are intensively used in agriculture. Characterized by high dispersibility and ion-exchange adsorption properties, when bentonite clays are applied to soils with heavy mechanical composition and also sandy soils, soil structure, water regime, and plant nutrient uptake significantly improve, leaching of micro- and macroelements from soil is hindered, as a result of which the productivity of corn and other annual crops increases by 18-20%, and fruit crops by 20-25%. High effect has also been obtained by applying bentonites together with nitrogen, phosphorus, and potassium fertilizers. Application of manganese, molybdenum, and other microelements together with bentonites is much more effective.

There are two large bentonite deposits in Western Georgia. These are the Askana and Gumbrina deposits. These deposits are notable in that the adjacent soils require the application of mineral fertilizers using bentonite clays.

The Askana deposit of bentonite clays is located in the Bakhvistskali basin and unites the Tsikhisubani, Mtisdziri, and Vani Ridge deposits. Bentonites are located at a depth of 120-180 meters. Here two varieties of bentonite clay are distinguished: greenish soft Askangel and soft-earth cream-colored clay from Askana.

Research should continue in this direction regarding the extraction and use of existing agricultural minerals on Western Georgia's soils to improve their fertility.

The extraction and use of agricultural minerals should be strengthened in agriculture based on continuing effective work using local agricultural minerals

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Methodology of Hybridization in Citrus Breeding

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For the successful implementation of breeding work aimed at obtaining various forms, new and promising starting materials are widely used in plant hybridization. To carry out the hybridization method within the process of distant hybridization, the following were used as research objects: mandarin selection forms derived from Kovano-Vase plants and the varieties Fortune Washington Navel, Early Maturing Trifoliata, and Citrus Ichangensis.

As is known, mandarins are characterized by variability of the fruit, which results in the formation of forms with features different from those of the parent plant. These acquired traits are hereditary, as they are passed down from generation to generation. Among the mandarin varieties obtained as a result of such variability, the Vase species are of interest—they differ from ordinary Unshiu by having a smaller growth habit.

As for Fortune Washington Navel, it is characterized by high-quality fruit, but its commercial spread is limited due to its low frost resistance. Therefore, one of the main problems in breeding this variety is to increase its frost resistance and develop early-maturing forms. One month after pollination, we conducted the first examination to check for fruit set and removed the isolators. Another inspection and record were made one month after the first.

Thus, the hybridization methodology in citrus breeding includes the following stages: Preparation of initial female parent components for crossing; Preparation of male pollen donors; Determination of pollen viability; Normalization and castration of flowers, isolation, pollination, and examination of fruit set.

Keywords: pollen grains, castration, isolation, pollination, citrus breeding