

GOALS AND DEMAND

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Contents

1. Introduction
 2. Greening of agriculture
 3. Realization of biological and agro-technical land improvement
 4. Use of the grounds without radical land improvement
 5. Phytomelioration and forest reclamation
 6. Combating erosion, use of eroded land, and recultivation
 7. Soil protective systems and improvement of soils subject to erosion and deflation
 8. Fertilizers
- Glossary
Bibliography
Biographical Sketch

Summary

Degradation of soil cover all over the world has reached disastrous proportions. Heavy use of chemical fertilizers and pesticides has resulted in significant deterioration of the ecological health of the soil. Partly to offset this trend, there has been a great upsurge of organic farming, and biological and agro-technical land improvement.

Biological land improvement is now being widely used for restoration of degraded pastures. Agro-technical methods of land improvement are used mainly on arable land and are directed mainly at loosening of the soil, i.e. reducing its density.

Phytomelioration and forest reclamation are important in biological land improvement. Phytomelioration is often used for restoration of productivity of pastures, and forest reclamation is widely applied as protective shelterbelts around arable fields, to reduce the effect of winds.

Water and wind erosion are reduced by a number of biological and agro-technical measures such as improvement of relief, planning and organization of the land, creation of shelterbelts, phytomelioration, and introduction of rational crop rotations.

Fertilizers can play an important role in maintaining high yields but they must be applied in such a way as not to disrupt the ecological balance of agricultural landscapes.

1. Introduction

The need for biologization, or 'greening', of agricultural production is important and urgent. First, increased agricultural production resulting from intensification of agriculture has invariably involved increase in consumption of energy and other resources per unit of production. This leads to aggravation of economic, social and environmental problems. These contradictions are especially strong in Russia. For example, from the 1950s to the 1990s production of mineral fertilizers increased 40 times. In the same period pesticide production increased 10 times, and application of mineral fertilizers rose to 110 to 120 kg/ha. Productivity of arable crops in this period only rose from 860 to 1620 kg/ha. The increase of crop yield per hectare attributable to increased application of fertilizers was only 400 kg, compared with 1000 to 1200 kg in developed countries).

In the 1990s manufacture of fertilizers in Russia was reduced by a factor of 10 to 12. Although application of fertilizers per hectare was reduced 10 to 12 times, productivity was only reduced by 30 to 40%.

The low levels of agricultural production in Russia, in comparison with the rest of the world, show that Russia has great scope for increasing the efficiency of its crop production, and that the current use of agrochemicals, even with the available low volumes, must be somewhat irrational.

2. Greening of Agriculture

With the modern situation of agricultural production, a new and possibly viable option is that of organic farming, i.e. an agricultural system giving full respect to ecological criteria and biodiversity, at the same time as producing high quality food with lower consumption of energy and resources.

Organic farming, as world experience has shown, does not provide the same level of productivity as intensive methods of cultivation. As far as Russia is concerned, however, transition to organic farming is not likely to result in economic loss, as the reduction in agricultural production will be matched by the lower level of maintenance and use of material resources.

In general terms, organic (alternative) farming can be considered as another kind of intensification of agriculture using biological principles to maintain high efficiency in crop production, while maintaining the fertility of the soil. The whole system is based on ecological principles, as used in wildlife management.

Some technological and organizational criteria of development of ecologically balanced agriculture in the state of Iowa (USA) have been discussed by Professor D. Pesek. He points out that alternative methods of housekeeping do not just mean smaller application of fertilizers and pesticides, but use of opportunities arising from mutual ecological relations. Thus it is considered, that the overall objective of new systems—to strengthen these relations instead of simplifying them—was forgotten, as agro-industrial systems, based on heavy use of inputs, were developed. It is also considered that no agricultural

technology should be excluded, but the intensity and, probably, frequency of their use can often be reduced (see *Global Amelioration Demand*).

Organic agriculture focuses attention on the use of crop by-products, e.g. straw, novel approaches to seedbed preparation and rational use of manure and other organic fertilizers. Special attention is given to nitrogen fixation, and optimal use of soil microflora.

Instead of meeting the nutritional demands of crop plants by using complexes of inorganic mineral fertilizers, greater use of organic matter should be promoted. Healthy microbial action can supply the plants with all their mineral needs, and often in a form which is more readily assimilated.

It is important to study and understand the relevant ecological conditions, e.g. of soil and climate, and to adapt the local form of agriculture to match those conditions. This requires monitoring of all components of the biosphere, including soil cover at all levels, and also realization of complex ameliorative works and elimination of any factors that might lead to soil degradation.

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Biographical Sketch

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